

**National Innovation Invention in Engineering and Built
Environment (PRIN-KAB 2019)**

26th August 2019
**Fakulti Kejuruteraan dan Alam Bina Universiti Kebangsaan
Malaysia**



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PREFACE

The National Innovation Invention in Engineering and Built Environment (PRIN-KAB 2019) is organised by the Centre of Engineering and Built Environment Education Research (PeKA), Universiti Kebangsaan Malaysia and held at Fakulti Kejuruteraan dan Alam Bina Universiti Kebangsaan Malaysia on 26th August 2019. The book of this event comprises a collection of 22 articles, which covers the innovation in Engineering, such as: teaching technology, engineering application, and conceptual design.

This specific knowledge-sharing event successfully gathers researchers from various universities, matriculations, polytechnique, schools and industries locally to meet and discuss issues pertaining to Innovation in engineering. Hence, it provides an opportunity for researchers in these fields to meet and discuss their most recent breakthrough research.

Finally, we would like to convey our most sincere appreciation to all participants and keynote speakers for your participation in our event. We are indebted to the Organising Committee for their relentless efforts in ensuring the success of this event. It would not have been possible without the great support from Universiti Kebangsaan Malaysia and also our sponsors, to whom we are most grateful for their kindness.

Thank you and do enjoy the valuable knowledge sharing session.

Ts. Dr. Haryanti Mohd Affandi
Chairman of PRIN-KAB 2019

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EFFECTIVENESS OF EDU-MARtrix TO ENHANCE STUDENTS' SELF LEARNING

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Keywords: MARTRIC, technology

ABSTRACT

EDU-MARtrix is a revolutionary mobile app that solves both teachers and students that has been going for so long. EDU-MARtrix are aiming to tackle multiple problems namely self-learning issues associated with student's vague information, overconsumption of paper, time consuming endeavors and orthodox method bores the students. EDU-MARtrix provide students with essential visualization of diagram as well as object in a whole new perspective that attracts 21st century students. In time of the bombardment with the modern technology, it is undeniable that AR is capable of giving a positive impact to the new generation. EDU-MARtrix also joins The Third Wave of Mobility where augmented reality (AR) application can assist students to effortlessly navigate their urban mobility options by gaining information at their fingertips. In the absence of a centralized management, there will be inconsistencies in relaying the information to users because there are no clear lines of authority. The AR system will be more structured where the system can be set according to the syllabus of learning at every stage of the desired study. By that, this feature will make the system more systematic. In addition EDU-MARtrix developed with a built in files management system which allows teachers to publish document, video, pictures and hyperlinks for students to reach thus, solving another problem for students to reaching their lecturer for additional learning material. EDU-MARtrix offers flexibility and hence paperless medium for both students and lecturers. A survey shows an average of 96.4% of 100 students from Johor Matriculation Student shows a positive feedback towards using augmented reality in education. With the statistical data supporting its overall impact and by having the ability to tackle multiple problems at the same time, EDU-MARtrix has the potential in leading innovation into education.

INTRODUCTION

Self-efficacy Teaching and Learning (T&L) process is fundamental in providing students with adequate basic knowledge in a particular subject. Self-efficacy among students is important in regards to their ability to perform tasks and activities (Bandura, 1986). It is also noted that the best way for students to learn is when they are able to discover things for themselves while taking advantage of new technology (Blumenfeld et al., 1991; Clinchy, 1989; Linn, et al., 2000; Lebow, & Wager, 1994).

New technology such as the mobile learning technologies are providing new techniques for educators to spread new knowledge while at the same time increase students' motivation (Derting & Cox, 2008; Mitra, 2007; Siozos et al., 2009). Given the complexity of the learning process as well as the time-consuming endeavour to ensure students' comprehension, one strategy to solve this problem must urgently be found. By encouraging self-efficacy among students with the help of a digital platform, educators are equipping students with one of the best learning experience they can offer.

EDU-MARtrix is a method that allows educators to upload contents and information on an online drive, and allow students to access them using a simple bar code that they can scan using their own smartphone.

This paper will analyse the performance of students and lecturers in using EDU-MARtrix in a Teaching and Learning experience.

METHODOLOGY

Samples; two cohorts of student were involved in this study. Cohort one comprise of 450 students in session 2018/2019. While cohort two consisted of 450 students in session 2019/2020. The EDU-MARtrix was implemented only for the latter cohort of foundation.

Design & Development; For Cohort 1, the EDU-MARtrix using diagnostic test worksheet and conventional worksheet. For cohort 2, EDU-MARtrix using online web-based to gain the data from the implementation of EDU-MARtrix.

Implementation;

Instrument; the study is conducted using mix-methods namely observation and questionnaire. In the first method, students who had not been thought about a topic were observed. They were instructed to complete worksheet by accessing the information and content available in EDU-MARtrix. As for lectures, there were asked on the frequency of using EDU-MARtrix in maximizing their delivery of course content. In the second method, a survey was conducted to test student's frequency of utilizing EDU-MARtrix (analysis was carried using t-test to compare the efficient use of EDU-MARtrix and collage portal. Similarly, a survey was performed on lecturers to find to what extent EDU-MARtrix aids them in disseminating the whole complete contents of the course.

Respondent: A diagnostic test was conducted on 2018/2019 session to and the results were collected. In 2019/2020 students were given an online worksheet and were instructed to use EDU-MARtrix tools to access contents in Google Drive. The worksheet results were obtained.

Data Collection Procedure: Data collection was conducted for two years. The EDU-MARtrix was implemented as alternative learning to support the face-to-face learning conducted by the lecturers.

CONCLUSION

MARTRIC is a system that allows students to access information regarding their course and syllabus efficiently. The technology is fast, mobile and easily reachable. The data supports this, as students in Cohort 1 that have access to EDU-MARtrix scored an overwhelmingly better results in the diagnostic test compared to the students in Cohort 2 that have no access to the system. In the absence of a centralized management, there will be inconsistencies in relaying the information to users because there are no clear lines of authority. The AR system will be more structured where the system can be set according to the syllabus of learning at every stage of the desired study. By that, this feature will make the system more systematic. It provides interactive material that is convenient and does making learning efficient and engaging. This EDU-MARtrix can assist students to effortlessly navigate their urban mobility options by gaining information at their fingertips.

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REFERENCES

- A. Mitra (2007). Substituting the chalk board with a Tablet computer. *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education*, 2, pp. 1122-112
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, New Jersey: Prentice-Hall.
- Blumenfeld, P. C., Soloway, E., Marx, R. W., Krajcik, J. S., Guzdial, M., & Palincsar, A. (1991). Motivating project-based learning: Sustaining the doing, supporting the learning. *Educational Psychologist*, 26 (3&4), 369-398.
- Clinchy, E. (1989). Education in and about the real world. *Equity and Choice*, 3, 19-29.
- Lebow, D. G., & Wager, W. W. (1994). Authentic activity as a model for appropriate learning activity: Implication for design of computer-based simulations. Paper presented at the 1994 National Convention of the Association for educational Communications Technology Sponsored by the research and Theory Division, February 16-20, Nashville, TN, USA.
- Linn, M. C., Kessel, C., Lee, K., Levenson, J., Spitulnik, M., & Slotta, J. D. (2000). Teaching and learning k-8 mathematics and science through inquiry: Program reviews and recommendations. Retrieved January 10, 2010, from <http://www.metiri.com/Solutions/k8ReportSubmitted.doc>
- Looi, C.K., Wu, L., Sun, D., Seow, P. Chia, G., Soloway, E., Norris, C., Wong, L.H. (2014) Implementing Mobile Learning Curricula in a Grade Level: Empirical Study of Learning Effectiveness at Scale. *Computer and Education*, 77, 101-115.
- P. Siozos, G. Palaigeorgiou, G. Triantafyllakos, T. Despotakis (2009) Computer based testing using “digital ink”: Participatory design of a Tablet PC based assessment application for secondary education *Computers & Education*, 52 (4), pp. 811-819
- T.L. Derting, J.R. Cox (2008). Using a Tablet PC to enhance student engagement and learning in an introductory organic chemistry course, *Journal of Chemical Education*, 85 (12) pp. 1638-1643

ENGINE BLOCKAGE WITH MOTION SENSOR

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ABSTRACT

The project is to construct the sensor and located at the side of the engine and this project is to prevent people from getting sucked into the aircraft engine. The combination of PIR Motion Sensor and Arduino Uno is an innovative way and represents the Engine Blockage with Motion Sensor will close the front part of the aircraft engine when movement is detected around the aircraft engine. The objective of the sensor to detect movement around the aircraft engine to prevent aircraft engineers from getting sucked into the engine. This model was successful due to there is no error in programming the code into the Arduino. With the help of the balloon pump, air will push the door latch forward and the magnet attach on the blockage will close the front part of the engine. The decision on choosing the Arduino Uno as the main device in this engine blockage with motion sensor is the sensible decision to make so that the project can be operate. This procedure happens only when aircraft is on the airport. As conclusion with all the effort, hard work, and many tries and error, this mock up project is successful.

KEYWORDS: Arduino Uno , Motion Sensor; Aircraft engine

INTRODUCTION

In today's world, turbine engine function as a trust in many aircraft. These engines have their part in the aviation industries. The past had demonstrated about some verifiable improvements and innovations that have prompted the present gas turbine. In this current world, many aircraft crashes occur these days. They are various cause of death to mechanical failure, human error, miscommunications and weather condition. The problem today about aircraft engine is that there are chances of aircraft engineers being sucked into the aircraft engine. This could lead to death of many aircraft engineers and can lead the company reputation bad. Till today there is no answers to avoid this situation. therefore we comes out with the projects name engine blockage with motion sensor. The main objective to ensure the safety of each of the aircraft engineer from avoiding them getting sucked into the engine.

PRODUCT DEVELOPMENT

Engine Blockage with Human Sensor function when the movement is being detected on ground, the blockage (net) will cover the engine, preventing aircraft engineers from being sucked into costly engine. This procedure only happens during aircraft is on land not in air. The movement sensor will detect movement around 100meters. By constructing this mockup project, it can avoid aircraft engineers or any ground officers from any injurious or death as well as to the name of the company gives off a bad taste in consumers' image.

For this mock up model, consists of various recycle material and electronic devices. There's the Arduino Uno, PIR Motion Sensor, Breadboard DuPont Jumper Wire Male to Male, Breadboard DuPont Jumper Wire Female to Male, LED, DC motor and potato chip container. On the other hand, for the movement sensor, will be an Arduino Uno R3 which is a programmable controller. The movement sensor to detect any movement surrounding the aircraft on land. In other words, the Arduino Uno plays a huge role in this project because this device is capable of various function but for this project it is programmable to detect movement. Once the switch is on, increasing of the rpm of the engine will be taken for action for a moment to indicate that the aircraft is taking off.

PROJECT FLOW

The combination of all the electronics and materials

For this project, the mock up model is combined all with electronic devices and few recycled materials. In order to complete this mock up model, there are various recycled materials and electronic devices that must be listed down. The list of recycled materials and electronic gadgets are as below.

1x Mister Potato Crips Container
5x left over bottles
1x balloon pump
1x Arduino Uno
1x LED
2x PIR Motion sensor
8x Male to Female Jumper

Assembling all the recycle material into a mock up aircraft engine

This project mock up model consist of 29 steps to do and will function as engine blockage with motion sensor to detect movement around the engine. It will also alert the ground workers. Using the PIR motion sensor as the essential component which measures infrared light radiating from objects. The PIR motion sensor is connected with the Arduino Uno to program it. As the result, LED is lightened up to indicate that motion is detected. This project consists of three different parts which is the PIR motion sensor which operates as a sensor to detect movement around the engine. The second part is the Arduino Uno where it acts as the brain of this project because the PIR motion sensor needs the program in order it is fully operational.

RESULTS AND DISCUSSION

As the result of this project, it is functioning well with the help of Arduino Uno. The review of this project, it is just a mock up model of an aircraft engine which consists of a fan blade, turbine engine, spirals and swirls. The blockage consists of a door latch and a fence/net. For this past few months, many tries and error had been tried out in order to ensure that this project is absolutely successful. However, the mock up aircraft engine is running and movement is detected by the PIR motion sensor, it will send the signal to the Arduino Uno indicating that movement is sensed. Then blue LED is lightened up also indicating that motion is present during that stage. Its help of the balloon pump, air is pumped, pushing the door latch (attach side to the engine cowling) forward with the fence/net attaching to the latch. Finally magnet attach on the fence/net will close the front of the engine.

CONCLUSIONS AND RECOMMENDATION

The engine blockage with motion sensor is prototype project that acts as the engine blockage to ensure the safety of aircraft engineers and ground workers. The project is to construct the sensor and located at the side of the engine. It also to prevent people from getting sucked into the aircraft engine. The objective of the sensor is to detect movement around the aircraft engine to prevent aircraft engineers from getting sucked into the engine. The engine blockage with motion sensor crucial and very useful. This mock up model can open the eyes and expand the mind of engine manufacturers to increase the safety level. As an aviator student, improvising is very necessary in developing a project so that it can be improved in future. In order for aircraft engineers and ground workers to be safe, engine manufacturers must put a high safety level. Furthermore, engine manufacturers can use this concept as the main explanation to prevent people getting sucked into the engine.

For this mock up model, an idea for new trials was given. Instead of using potato chips container, use something more rigid such as empty cans. For even better purposes, use a 3D printer to make it more realistic even though it is quite costly. The mock up model should be completed with 3D printer as the main purpose so and the interior parts of the aircraft engine could be seen easily. It's best for aircraft engine manufacturers to see this mock up model and improvise it because it brings safety to ground workers especially aircraft engineers.

REFERENCE

- Advanced Materials for Aircraft Engine Applications-JSTOR (online) Available at https://www.jstor.org/stable/2876677?seq=1#page_scan_tab_contents (Viewed on 1st MAY 2019)
- “Airbus Engines in the future”- (online) Available at <https://www.airbus.com/> (Viewed on 1st MAY 2019)
- CFM 56-”- (online) Available at <https://www.cfmaeroengines.com/engines/cfm56/> (Viewed on 1st MAY 2019)
- Colin Cutler. (2017). *How the 4 Types of Turbine Engines Work*. (online) Available at <https://www.boldmethod.com/learn-to-fly/systems/the-4-types-of-turbine-engines> (Viewed on 1st MAY 2019)
- Composites in commercial aircraft engines, 2014-2023-Composite World (online) Available at <https://www.compositesworld.com/articles/composites-in-commercial-aircraft-engines-2014-2023> (Viewed on 1st MAY 2019)
- Cowling Installation- Experimental Aircraft Info (online) Available at <https://www.experimentalaircraft.info/articles/engine-cowling-installation.php> (Viewed on 1st MAY 2019)
- Danny. (2018). *what are Turbines? | Types of turbines & their applications*. (online) Available at <http://mechstuff.com/turbines-types-of-turbines-applications-in-powerplant/> (Viewed on 1st MAY 2019)
- GE Started Testing the World’s Largest Jet Engine – GE Reports (online) Available at <https://www.ge.com/reports/video-ge-started-testing-the-worlds-largest-jet-engine> (Viewed on 1st MAY 2019)
- Henson.S.(2017). *GE9X Commercial Aircraft Engine*. (online) Available at <https://www.geaviation.com/commercial/engines/ge9x-commercial-aircraft-engine> (Viewed on 1st MAY 2019)
- Henson.S.(2017). *TheGE90Engine*. (online) Available at <https://www.geaviation.com/commercial/engines/ge90-engine> (Viewed on 1st MAY 2019)
- Henson.S.(2017). *TheCF6Engine*. (online) Available at <https://www.geaviation.com/commercial/engines/cf6-engine> (Viewed on 1st MAY 2019)
- Howell.C.(2016). *Aviation Safety* (online) Available at <http://aviationsafetyblog.asms-pro.com/blog/what-is-aviation-safety> (Viewed on 1st MAY 2019)
- James. (2014). *Arduino Development Kits: Advantages and Features*. . (online) Available at <https://www.semiconductorstore.com/blog/2014/Arduino-Development-Kits-Advantages-and-Features/811> (Viewed on 5th MAY 2019)
- Joe Escobar. (2006). *Turbine Engine History*. (online) Available at <https://www.aviationpros.com/engines-components/aircraft-engines/turbine-engines-parts/article/10383708/turbine-engine-history> (Viewed on 5th MAY 2019)
- Kimberly.(2017). *50AmazingAircraftEngines*. (online) Available at <https://www.flyingmag.com/aircraft/50-amazing-aircraft-engines>. (Viewed on 5th MAY 2019)
- Koris.S. (2017). *Bird strike to engine forced AirAsia X aircraft to divert to Brisbane*. (online) Available at <https://www.nst.com.my/news/nation/2017/07/254302/bird-strike-engine-forced-airasia-x-aircraft-divert-brisbane-says-airline> (Viewed on 5th MAY 2019)
- Larazoo.C. (2016). *Types of Turbines*. (online) Available at <http://greenbugenergy.com/get-educated-knowledge/types-of-turbines> (Viewed on 5th MAY 2019)
- Lee. (2017). *Bird Strike*. (online) Available at https://www.skybrary.aero/index.php/Bird_Strike (Viewed on 5th MAY 2019)
- Lily. (2017). *Heron of Alexandria*. (online) Available at <https://www.britannica.com/biography/Heron-of-Alexandria> (Viewed on 5th MAY 2019)
- Mansfield.K. (2015). *Airline horror as airport worker is killed by being sucked into plane engine*. (online) Available at <https://www.express.co.uk/news/world/627531/man-died-sucked-jet-engine>. (Viewed on 5th MAY 2019)
- Peter. (2018). *ArduinoFunction*. (online) Available at <https://www.arduino.cc/en/Reference/FunctionDeclaration> (Viewed on 5th MAY 2019)
- PIR Motion Sensor –Explore and Learn. (online) Available at <https://learn.adafruit.com/pir-passive-infrared-proximity-motion-sensor/testing-a-pir> (Viewed on 5th MAY 2019)
- Rafeal (2014). *AIRCRAFTENGINES*. (online) Available at http://www.aviationexplorer.com/Aircraft_Engines.html (Viewed on 5th MAY 2019)
- Rahul. (2017). *what are the Different Types of Arduino Boards*. (online) Available at <https://www.elprocus.com/different-types-of-arduino-boards> (Viewed on 5th MAY 2019)

- Sam Blum. (2019). *the Biggest Jet Engines in History Are Finally Ready to Power Boeing's Biggest Plane* (online) Available at. <https://www.popularmechanics.com/flight/airlines/a25749178/boeing-ge9x-777x-photos/> (Viewed on 5th MAY 2019)
- Sebastian. (2017). (online) Available at. *Turbojet Engine*. https://www.skybrary.aero/index.php/Turbojet_Engine (Viewed on 5th MAY 2019)
- Seidenman.P. (2016). *Turbine Engines Education Series – Types of Turbine Engines* (online) Available at <http://blog.covingtonaircraft.com/tag/types-of-aircraft-engines/> (Viewed on 5th MAY 2019)
- Smith.(2017). *The GENx Commercial Aircraft Engine*. (online) Available at <https://www.geaviation.com/commercial/engines/genx-engine> (Viewed on 5th MAY 2019)
- Spanovich.D. (2016). *How Bird Strikes Impact Engines*. (online) Available at <https://www.mro-network.com/maintenance-repair-overhaul/how-bird-strikes-impact-engines> (Viewed on 5th MAY 2019)
- Wood,D.(2017) "Design of Cowlings for Air-Cooled Aircraft Engines," SAE Technical Paper (Viewed on 5th MAY 2019)

CORN BASED BIOPLASTIC

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ABSTRACT

Bioplastic is plastics that are biodegradable and biomass-based. Starch-based bioplastic had been widely used in various application but the usage had been limited due to lack of water barrier properties and poor mechanical properties. The intensive studied in recent years, to improve starch-based bioplastic properties. Therefore, this study was conducted to develop the corn-based bioplastic with the optimum ratio of glycerol and starch. The preparation of the sample starts with optimizing corn-based bioplastic produce with different ratios of glycerol and corn starch (2.5:1, 3:1, 3.5:1). After that, acetic acid (6%, 7.5 % of total mass) and distilled water (55%, 65% from mass of starch used) were added. Corn-based bioplastic offers so much advantage such as healthy cancer free, pollution free, do not cause death of marine animals, required less energy to be produced, light weighed which can be used for the production of plastic carry bags, reduce the dependency on fossil fuels for the production, made from renewable raw material and more.

KEYWORDS: Corn starch; Bioplastic; Glycerol.

INTRODUCTION

In recent years, Malaysia has been focus on go green campaigns and encourage environmentally friendly behaviour among the Malaysian. These campaigns are aimed to raise public awareness of environmental degradation and green behaviour. Some examples of go green campaigns are “No Plastic Bag Day Campaign”, “3R campaign” (Reduce, Reuse, Recycle) and “Environmental Education”. The Malaysian government also has encouraged the Malaysian to practices green behaviour such as household waste recycling, purchasing of sustainable products, conserving water or energy and more.

Nowadays, bioplastic is another alternative for almost all conventional plastic material and application. Based on the raw material use, bioplastics will have the same properties as conventional plastics. Based on Andrej, bioplastic is plastics that are biodegradable or biomass-based or both. Bioplastics are a new generation of plastics and generally are derived from renewable raw materials such as starch which are not hazardous and will decompose into carbon dioxide.

Starch is used as a source for sustainable and eco-friendly raw material. The development of starch-based bioplastic was influenced by the factor which is to produce better product quality, abundant, cheap and a renewable resource. However, they are brittle and hydrophilic therefore it limiting their processing and application which led to a problem such as lack of water barrier, poor mechanical properties and more. Starch-based bioplastic also contains additives such as plasticizers and compatibilizers to improve process ability, water resistance and tear strength.

In general, plasticizers were added is to reduce brittleness, impart flexibility and reducing recrystallize of starch. The main role of plasticizer is to reduce the strong intermolecular interaction between starch molecules by enhancing the flexibility and processibility of starch. By using a plasticizer, the brittle problem of starch can be decreased. However, for excellence plasticization, the compatibility and miscibility between polymer and plasticizer are very important. Also, the optimum ratio between corn starch and plasticizer (glycerol) is important because it will strongly affect the mechanical properties.

PRODUCT DEVELOPMENT

By 2020, the production of bioplastic or biodegradable plastic is expected to increase. Therefore, the rising favor in bioplastic is observed.

This product offers so much advantage which is it's made from natural resources, sustainable, reduce the dependency on fossil fuels for the production, biodegradable, compostable, reduce the pollution of the environment and carbon footprint, and do not contain any harmful additives.

This product also suitable used for packaging application as this product do not compromise the flavor and smell of the product stored. Table 1 shows the composition of prepared corn-based bioplastic.

Table 1. Composition of prepared bioplastic

Sample	Corn Starch (g)	Glycerol (g)	Acetic Acid (g)	Water (g)
1	10	25	2.43	5.5
2	10	25	3.04	5.5
3	10	25	2.49	6.5
4	10	25	3.11	6.5
5	10	30	2.13	5.5
6	10	30	2.66	5.5
7	10	30	2.79	6.5
8	10	30	3.49	6.5
9	10	35	3.03	5.5
10	10	35	3.79	5.5
11	10	35	3.09	6.5
12	10	35	3.86	6.5

CONCLUSIONS

Corn-based bioplastic has a wide and bright future in the plastic industry which can be used in various applications that will replace the current commercial plastic. Due to its made from the natural resource it can reduce the pollution of the environment and also consistent with Malaysian Go Green Campaigns. Further research on the additional process is needed to enhance the properties of corn-based bioplastic.

ACKNOWLEDGMENT

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REGENERATED CELLULOSE FIBER FROM COTTON LINTER VIA WET SPINNING METHOD

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ABSTRACT

Regenerated cellulose fiber (RCF) with and without graphene oxide (GO) were formed by using wet spinning via precooled method. NaOH/urea solution was used as the medium for cellulose dissolution and combination of sulphuric acid/ammonium sulphate as the coagulation system. The purpose of this study is to form long regenerated cellulose fiber which embedded with graphene oxide to be use in textile application. The fiber was analysed for tensile strength, crystallinity and thermal properties. Main finding is that the fiber without GO has higher tensile strength compare to RCF with GO. The crystallinity of the fiber also decreases as the GO being added into the cellulose dope. However, the thermal properties of regenerated cellulose fiber with GO show some improvement in thermal stability compared to the fiber without GO.

KEYWORDS: Cotton linter; graphene oxide; wet spinning; precooled method.

INTRODUCTION

Graphene and graphene oxide (GO) were well known to be the best filler for composite because it's outstanding mechanical strength, good flexibility, electrical conductivity and much more. In order to make graphene/polymer composite, solution mixing method is one of the most commonly used, since it is straight forward, does not requires any special chemical and could be use in large production scale. But one of the major concern while making graphene/polymer composite is that graphene or GO does not has good ability to dispersed well in solution because it tends to agglomerate to one and another. It had been well known that incorporation of nanofillers in any composite had increase the properties of most composite. The nanofillers expected to be interacting with cellulose solution and aid with the hydrogen bonding formation during cellulose regeneration process. Objective of this study were to evaluate the mechanical and physical properties of regenerated cellulose fiber (RCF) by loading GO to the cellulose solution.

Materials and method

Material used for this study were cotton linter, urea, NaOH, sulphuric acid and ammonium sulphate. All of the material and chemicals were used as received without any modification. NaOH/urea solution was prepared by using precooled method. The frozen solution was then thaw to -13°C before specific amount of cotton linter was added into the solution and the mixture was stir vigorously for 5 minutes until all of the cotton linter dissolved and form cellulose solution. Predetermined amount of GO solution was added into the dissolved cellulose solution and stirred until its form homogenous solution. The dissolve cellulose was used as wet spinning dope and coagulated in H₂SO₄/(NH₄)₂SO₄ solution. The regenerated cellulose fiber formed were being rinsed with distilled water until the fiber fully neutralised. The final formation of fiber was dried by using air dry for 12 h for further characterisations. RFC were labeled as RCF-0 and RCF-GA for fiber without and with GO respectively. The Crystallinity index (CrI) of RCF were calculated by using equation;

$$CrI = \frac{A_{crystal}}{A_{total}} \times 100$$

PRODUCT DEVELOPMENT

Regenerated Cellulose with Graphene Oxide (GO)

The composite fiber containing GO nanoparticles was successfully formed via wet pinning method from cellulose dope NaOH/urea solution by in situ synthesis. The photograph of fiber was presented in Figure 1. Based on Figure 1, the RCF with GO was darker in colour while the one without GO was colourless.



Figure 1 Dried RCF (a) RCF-0 and (b) RCF-GO

X-ray diffraction (XRD)

Figure 2 shows the XRD diffraction of RCF-0 and RCF-GO. The diffraction peaks at $2\theta = 12.1, 20.2$ and 21.7 are characteristic for cellulose II. Based on the intensity of the peaks, crystallinity index (CrI) could be calculated. The CrI of RCF is presented in figure 3. Based on the results, the CrI of RCF drop drastically from 92.20% to 82.2% by just adding small amount of GO in the cellulose solution. We can predict that addition of GO had effected the recrystallization process of cellulose due to the GO nanosheet presented in the solution act as a kind of nucleation inhibitor. Nucleation inhibitor could reduce nuclei and also confine the cellulose crystal formation (Mathew et al. 2006). This phenomenon cause to formation of larger amount of amorphous phase in the RCF. The cellulose crystal was inhibited to form perfect highly uniform order of cellulose by space restriction due to the dense structure of cellulose-GO composite and disturbed the ability for new hydrogen bonding to form highly crystalline formation (Moharram et al. 2016).

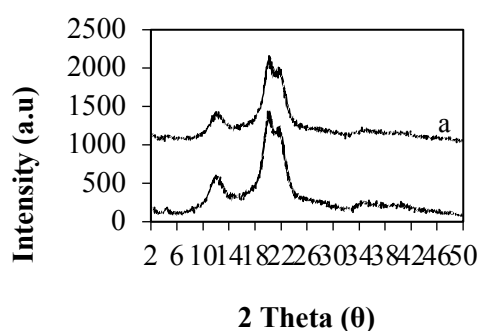


Figure 2 X-ray diffraction patterns of RCF (a) RCF-0 and (b) RCF-GO

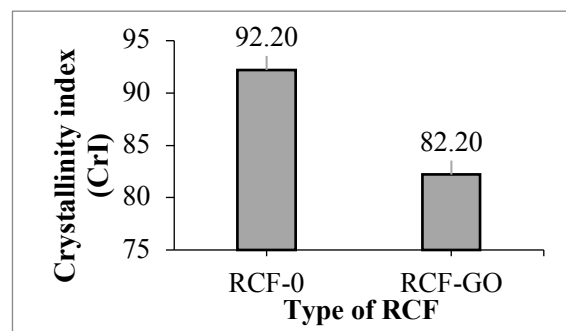


Figure 3 Crystallinity index (CrI) of RCF with different loading of GO

Mechanical properties

Figure 4(a) shows the tensile strength for RCF with and without GO. RCF-0 exhibited the highest tensile strength of 170.96 MPa. In general, the addition of GO in the cellulose fiber should increase the mechanical strength of RCF. However, this study found that addition of GO loading had gradually decrease the tensile strength of RCF. It is noted that the tensile strength was 157.80 for RCF-GO. These value corresponding to the decrease by -7.7 %

relative to RCF-0. Nonetheless, figure 4(b) shows the elongation at break for all RCF. The elongation at break of RCF increases with increasing GO loading. However, the changes were only up to 0.02% which can be neglect.

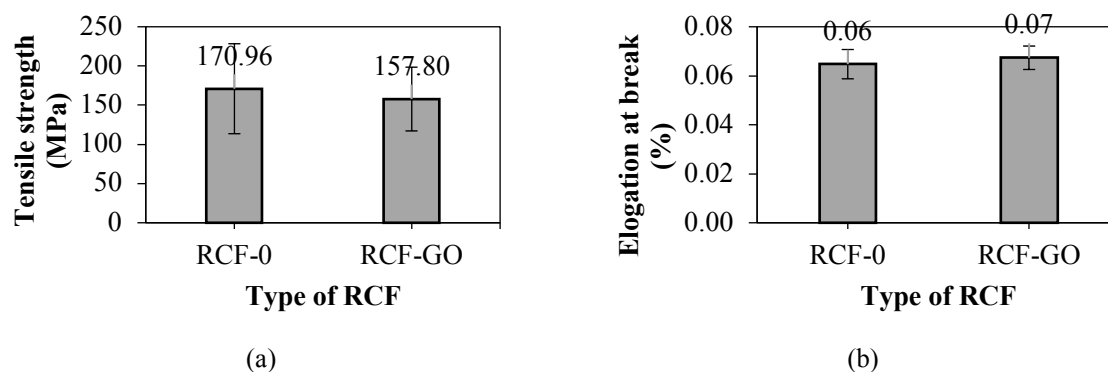


Figure 4 Mechanical properties of RCF-0, RCF-GO (a) tensile strength and (b) percentage of elongation at break

As higher loading only weakens the mechanical strength of the RCF, this attribute that GO disturb the ability of cellulose to regenerate and form uniform networking. Excessive of GO also causes the abundancy of GO which were not fully interacted with cellulose (Wang et al. 2012). Once, Wang reported when the mount of GO added to the cellulose are higher than 1 wt%, the mechanical properties of the cellulose/GO composite (Wang et al. 2012). This phenomenon illustrate that the reinforcement effect of GO has a close relationship with dispersion of GO in the polymer. However, Zhang reported by using ionic liquid as the main solvent for cellulose dissolution process, the mechanical properties increases at first with increases at first but then decreases prolong the addition of GO loading (Zhang et al. 2007).

Thermal stability (TGA)

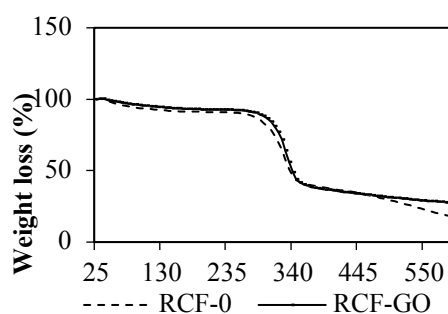


Figure 5. TGA curve of RCF

The TGA analysis was conducted in order to test the thermal stability of RCF with and without GO. The analysis was conducted at room temperature of 25 to 600 °C as shown in figure 5. Addition of GO has enhance the thermal stability of RCF as the temperature for maximum decomposition rate (T_{max}) of fiber containing GO was delayed. This indicates that the composite formed has better intermolecular interaction between the cellulose and GO (Gan et al. 2018). The interaction also causes in drop of intermolecular mobility ability of the polymer segment at the interface of GO and cellulose. Hence, higher yield of char was obtained after the test completed at 600 °C for the composite of RCF with GO. This finding also confirmed that composite formed has higher thermal stability and the addition of GO as filler had reduced the decomposition rate of the whole composites. This finding give us opportunity to prolong the application of cellulose in other produce since cellulose itself have higher decomposition rate. Not to forget, over-loading could also cause an irreversible aggregation in some way which decreases the thermal stability of composites (Wu et al. 2018).

CONCLUSIONS

The cellulose graphene composite had found to cause decrease in tensile strength and CrI of the RCF. Surprisingly, the mechanical strength of the RCF had not increase after the addition of GO. However, the elongation at break for all sample with and without Go hardly change. The changes were only up to 0.02% which can be neglect. Nonetheless, the thermal properties of RCF with GO had increased. This prove that GO can delay the degradation process of cellulose and increases the composite thermal stability. Even though the mechanical strength of the RCF drops with addition of GO, but GO does improve the RCF thermal stability which could be a jumping stone for the fiber to last longer in some applications.

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REFERENCES

- Gan, S., Zakaria, S., Chia, C. H. & Kaco, H. 2018. Effect of graphene oxide on thermal stability of aerogel bio-nanocomposite from cellulose-based waste biomass. *Cellulose*. doi:10.1007/s10570-018-1946-5
- Mathew, A. P., Oksman, K. & Sain, M. 2006. The effect of morphology and chemical characteristics of cellulose reinforcements on the crystallinity of polylactic acid. *Journal of Applied Polymer Science* 101(1): 300–310. doi:10.1002/app.23346
- Moharram, M. A. K., Tohami, K., El Hotaby, W. M. & Bakr, A. M. 2016. Graphene oxide porous crosslinked cellulose nanocomposite microspheres for lead removal: Kinetic study. *Reactive and Functional Polymers* 101: 9–19. doi:10.1016/j.reactfunctpolym.2016.02.001
- Wang, B., Lou, W., Wang, X. & Hao, J. 2012. Relationship between dispersion state and reinforcement effect of graphene oxide in microcrystalline cellulose-graphene oxide composite films. *Journal of Materials Chemistry* 22(25): 12859–12866. doi:10.1039/c2jm31635h
- Wu, G., Xu, X., He, X. & Yan, Y. 2018. Preparation and characterization of graphene oxide-modified Sapium sebiferum oil-based polyurethane composites with improved thermal and mechanical properties. *Polymers* 10(2). doi:10.3390/polym10020133
- Zhang, B. H., Wang, Z., Zhang, Z., Wu, J., Zhang, J. & He, J. 2007. Regenerated-Cellulose / Multiwalled-Carbon-Nanotube Composite Fibers with Enhanced Mechanical Properties Prepared with the Ionic Liquid 1-Allyl-3-methylimidazolium Chloride ** (2004): 698–704. doi:10.1002/adma.200600442

INNOVATION IN THE STUDIO TEACHING THROUGH S.O.L.E MODULE

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ABSTRACT

Design education is an immersive style of teaching and learning and hard to be explained to those who have not experienced it. A good way of understanding it is to experiment with teaching and learning in the studio. Nevertheless, effective teaching and learning in the studio has been marred by folk practices that imply methods of “I teach as I was taught”. Hence, the future of architectural education must change from a largely folk inspired teaching to one that immense with technology and promotes innovation, problem-solving and critical thinking. An action research was conducted to further inquiry on the application of the S.O.L.E model for the period of one semester (14 weeks) in two architectural schools (1 public & 1 private) and reviewed how the selected case studies respond to the innovative teaching in their studio teaching & learning. Subsequently a thematic observation on the effectiveness of the model was conducted at the end of semester. The results reveal 1) the issues, challenges and values in teaching and learning in the studio and 2) discussing the new role of students and educator in the design education. Finally, this paper proposes an alternative model to the existing pedagogy to move out from current implicit theoretical foundation towards outside conventional studio viewpoints.

KEYWORDS: S.O.L.E module; architecture education; pedagogy; studio.

INTRODUCTION

Currently, the architecture profession in the construction industry is facing rapid change in terms of technology and knowledge information. New ways of thinking about architecture education suggest new approaches, many of which have been enabled by rapid advances in technology. Among concerns raised by Johnson & Gunderson, (2010); Becerik-Gerber, Gerber, & Ku, (2011) today’s architectural graduates lack collaboration and teamwork skills apart from computer skills as the critical abilities. Educators should be ready to integrate technology into innovative teaching and learning in order to make the teaching and learning process more effective. Lack of adequate workforce that equipped with the latest technology is hampering the industry to move forward (Becerik-Gerber et al., 2011). Furthermore, innovation and active learning are the near future especially towards architecture field of study (Khalifa, 2017). In addition, Nabih, (2010) argues that lecture-based education leads to a disparity in understanding the practical problems in reality. Hence, today’s 21st century, design graduates especially architecture must have the skills to deal with ever-changing technology that requires quick solutions skill.

MODEL DEVELOPMENT

This article proposes S.O.L.E model in the design studio for final architecture degree students. It is anticipated that the selection was based on the maturity of the final year students to make a decision and to participate in the peer assessment and evaluation. Subsequently, a second assessment was evaluated by the tutors on their reliability in giving an assessment to their peers. An additional 10% was given on top of the studio marks for their participation in the peer feedback and assessment process. A useful way of motivating students to carry out peer feedback rigorously is described by Bloxham & West, (2007). The students were awarded certain merits and extra incentives for taking time on the assessment criteria and writing the feedback. Based on the report, the students were reported to acknowledge the incentives and motivated them to achieve them.

S.O.L.E framework

The S.O.L.E model started with a series of input lectures from the tutors (lecturing). Prior to the input lecture, the students were required to provide critical reading materials during the class. Next, the students were divided into several groups and design critiques were facilitated by the tutor assigned. In this step, books and reference materials will be shared and presented in the group (sharing). Subsequently, the students participated in the peer feedback and peer assessment to evaluate their peer's work and design in the given group (assessment). This is supported by the view from Lee & Hannafin, (2016) on the student's role to assume more participation to cultivate their design ideas with support from the peers and tutors. The S.O.L.E model takes into consideration the aspect of engagement, support, scaffolding and guidance and coordinates them to create a more holistic studio experience. The support group discussion and feedback focus on goals by utilizing the social-cognitive to help students evaluate each other's progress. The following methodology were supported by the used of existing Apps such as PADLET, KAHOOT and etc. to enhance studio learning in the studio project.

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Figure 1. The relationship matrix in the S.O.L.E conceptual framework

The S.O.L.E model takes into consideration the aspect of engagement, support, scaffolding and guidance and coordinates them to create a more holistic studio experience. The support group discussion and feedback focus on goals by utilizing the social-cognitive to help students evaluate each other's progress. The following methodology were supported by the used of existing Apps such as PADLET, KAHOOT and etc. to enhance studio learning in the studio project.

CONCLUSIONS

The future directions of S.O.L.E module will lead to the adoptions of teamwork, critical thinking, technologically competent and multidisciplinary approach. The module perhaps interweaving inside the social-cognitive in social settings like studio and emphasizes the cognitive and behavioural aspects that design students experience as part of the learning outcome. Thus, provides a more active participation from the students to explore the dynamic of the subject matters. The quality interaction between peers inside the cyber tool such as PADLET, etc. can create

a conducive, prompt and real-time response with latest and updated information. Further discussion of these issues is not included here, as the aim of the paper is to gauge the feedback about the S.O.L.E framework not on the new pedagogy per se. The possibilities are clearly emerging. The challenge is for academics and board of architect to redesign the curricula to suit the updated technology in the market and to furnish the future graduates with enough skills for the industry in the future e.g. artificial intelligence (A.I) and virtual realities (V.R) as part of the teaching and learning innovation in the studio.

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URBAN AGRISCHOOL: URBAN AGRICULTURE EDUCATION THROUGH THE GREENHOUSE MODULE

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ABSTRACT

Agriculture is a very important sector to ensure the sustainability of food resources in any country in the world. Interest in the agricultural sector are declining since it had received the 3D perception i.e. “Dirty, Dangerous and Difficult” job. The modern agriculture sector, however, now requires educated and interested people working in this sector, which remains important and are less laborious than the traditional agriculture. Urban Agrischool program was envisioned as one of a way to attract the young generation’s interest to the agricultural sector. The design of this module put focus on urban agriculture which are picking up interest in the communities and comprises of both agricultural sciences and agricultural engineering. The first module of the Urban Agrischool was developed through the concept of greenhouse. An Urban Agrischool program was held on 9 and 10 March 2019 in Sekolah Kebangsaan Sedenak, Johor supported by industry partners Kulim (M) Bhd and AgriSpace Tech Sdn Bhd. The program received good verbal feedback from teachers and students and from a survey conducted shows an increase of interest from pre- and post-program of 29.2% percent amongst the students.

KEYWORDS: Urban Agriculture; Agricultural Engineering; Engineering Education
Module; Greenhouse

INTRODUCTION

Urban Agrischool program is a program aimed at educating students on agriculture focusing on the appealing side of urban agriculture. The program is also aimed at changing the 3D perception on agriculture, which is *Dirty, Dangerous and Difficult* to a more positive perception. Even as our life advances, agriculture remains essential, in fact grows to be more important with the ever-increasing populations. Food security issues continues to be an important issue discussed in Malaysia. Through this program, it is hoped that education can be given earlier on the importance of agriculture so that students would develop ideas on how they can contribute to agriculture not only as farmers, but as agricultural engineer, agriculture scientist, agricultural technologist, farm manager and farm owners.

Urban agriculture can be explained shortly as farming activities which is done inside and around cities. This can be planting in section of lands around housing areas, a shared farm plot for community use or even farm factories. The urban farming activities can be beneficial to a community not only to provide fresh food, but it helps improve community relationships and can be used to fund other community activities. Recent innovation and technology certainly help with urban farming growth. Some examples are drip irrigation and hydroponics that helps with reducing time and labour on watering the plants, vertical farming and greenwall that increases planting space, vermicompost and bokashi bin that reduce fertilizer cost and greenhouse and mesh structures that helps to control pests.

The Urban Agrischool is planned to include all urban farming elements, however each program that will be organized will not include all of the elements. A program will focus on one or two elements only so that it can be more focused, fun and remains educational without too much information shared to the audience in a short program.

URBAN AGRISCHOOL

The Urban Agrischool was designed to give a new perspective on agriculture especially to the new generation. Through this module, students will be able to understand the modern side of the agricultural sector. It is hoped that through this program, agriculture that is always considered conservative and dirty will turn out to be something interesting to be involved in.

The Urban Agrischool gives insights on how science, technology, engineering and mathematics is important in agriculture and this will show that everyone can be involved in the agricultural sector. The module developed for the first program was on greenhouse technology. This module includes two types of learning skill which is theory and practical. Presentations on urban agriculture and greenhouse technology was given initially before the students was split into groups for the practical activities.

Although the Urban Agrischool program puts more focus on agriculture as the main objectives also were designed to nurture student's motivation, creativity, innovative thinking, teamwork and communication skills. Through the activities, the students are given the opportunity to express themselves through creative works, share their ideas in groups and present their work in front of audiences. This would also give a sense of pride to the students when their work was admired by friends and teachers. A friendly competitive environment was also build-up to bring in a competitiveness element between groups during the activities.

Urban Agrischool: Greenhouse Module

The Greenhouse Module is inspired to trigger students' interest in urban agriculture. Through this module, the concept of greenhouse will be delivered via a short introductory presentation and three main activities.

A short presentation was given by a 4th year student in the Bachelor of Engineering (Agricultural and Biological) program on agriculture overview and urban agriculture in Malaysia. The second presentation gave introduction on greenhouse technology and shared on plant physiological needs without showing any pictures of a greenhouse so as not to imprint any greenhouse design on the students yet. This is to prepare for the activities.

The first activity was built to explore students' idea and creativity in imagining greenhouses based on their own initial idea without any prior greenhouses visual provided. The students presented and discussed about their idea and finding similarities and differences between the ideas.

The second activity was designed to nurture teamworking skills and psychomotor skills. The students in groups discussed and choose one design from the many ideas presented during the first activity to be made into a mini model of a greenhouse using available stationeries and recycle materials. Then the group presented their models in front of everyone describing their ideas, experience and challenges. The final activity was conducted by engineers from Agri Space Tech Sdn Bhd, where the students participated in an *explorace* type activity. They were educated on seed, planting, pest and nutrient-film technique (NFT) through the activity. A selected group of students also had the chance to build an actual greenhouse using PVC pipes for their school. A set of hydroponic planters were planted with Kailan seed and the students were tasked to monitor the growth until harvest. The students were tasked to record the plant growth and their own experience in a provided workbook. Pictures during the activities can be seen in Figure 1.

A pre and post survey was conducted during the program. The program received good feedback from teachers and students with increase of interest of 29.2% percent. Almost all the participants agree that the Urban Agrischool program increase their interest in agricultural. Almost all the students give a positive scale (7 to 10) as an answer for the question, if they want to join the program again. All of them are also interested in learning more about agriculture and agricultural technologies after going through the program.

CONCLUSIONS

The program was considered successful with increase in interest of 29.2% amongst the students. In the future, this program will be continued to reach as many young people as possible to introduce the concept of urban agriculture and transform the perception of agricultural sectors. It is hoped that through this program it will attract more people to venture into agricultural sector not only as farmers, but as agricultural engineers, agricultural scientists, agricultural technologists, farm managers or farm owners.



Figure 1. (Top left) Students drawing a greenhouse out of their imagination. (Top right) Students building greenhouse model in groups (Bottom left) Agriculture themed *explorace* showing students participating in quizzes at checkpoint (d) Students building an actual PVC greenhouse for the school

ACKNOWLEDGMENT

The Urban Agrischool team expresses utmost gratitude to the following organization for the Urban Agrischool: Greenhouse program in Sekolah Kebangsaan Sedenak: Department of Biological and Agricultural Engineering, MSAE-SC club, PIBG Sekolah Kebangsaan Sedenak, Kulim (M) Bhd and Agri Space Tech Sdn. Bhd for the support that made the program a success

THE MULTI FUNCTION WELDING JIGS

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ABSTRACT

The Multi-Function Welding Jigs is a project to provide facilities for vocational college students in conducting practical work, especially for welding position including horizontal, vertical and overhead for plate and pipe base material during their training session and practical works. Industrial Revolution 4.0 (I.R 4.0) lead for the design of good facilities for educational and training purpose. Hence, project has started with the engineering design process's stage. Then, suitable raw materials have been identified and being used for fabricate the Multi-Function Welding Jigs. The complete structured of Multi-Function Welding Jigs was tested in – house through Visual Test (VT) and Dye penetration Test (PT) to detect defects of welding. In the meantime, the Visual Test (VT) conducted on the welding joint. The efficiency of this jig in terms of functionality was measured over simulation conducted by team during operational conditions. Other than that, the static stress analysis of project shows that the Multi-Function Welding Jigs has been successfully designed and constructed. It consists of value **33.22MPa** of maximum stress which is lower than yield strength 210MPa. While the value of safety factor indicates **6.2** can accommodate than stronger **200N** load than obtained when simulated on Autodesk Inventor to create real situation during operational condition. Hence, it shows that the structure reduces the chances of failure during operation. The result was satisfied and successfully fabricated for the welding process training purposes at Vocational Collages.

KEYWORDS: Multi-Function Welding Jigs; Technical Education and Vocational Training (TVET); Industrial Revolution 4.0

INTRODUCTION

The Vocational Education Transformation Program (TPV) is a program covering the existence of vocational colleges. The transformation program includes a comprehensive review of the existing curriculum, adopting several new assessment and assessment methods, improving teacher skills and strengthening networking with the industry. This Vocational Education Transformation (TPV) has started in 2012 and is further enhanced when placed into one of the aspirations systems including access to quality education in Malaysia's Education Development Plan (PPPM) 2013-2025.

Meanwhile, Industry Revolution 4.0 is extremely relevant and increasingly important in manufacturing for a multitude of reasons. The importance of Industry 4.0 is in the key of importance towards educational and training field. It helps the trainers or educators with current challenges by becoming more flexible and making reacting to changes in the situation become easier with exist the better facilities. Industry 4.0 is sustainable long-term, assisting in finding solutions for any challenge that arises.

Teaching and training session at Vocational College especially demand on better solution of better facilities without affected the largest cost. This idea give proposed the Mutli-Function Welding Jigs has been discovered.

NOVELTY OF PROJECT

The needs to transform the Technical Education and Vocational Training (TVET) field become important key to stand over the challenges of the 4th Industrial Revolution (IR 4.0). The reflective toward Vocational Educational Teaching and Training core business has been recognized. Acquired facilities to perform better training and test conduct should be improved during learning session. Designing the efficient jigs and able to show how work place simulated has been focused in this study. Therefore, it is sensible to modify the existing jigs in order to improve welding purpose training in order to realize the full potential of welding process. To fulfil this purpose, Multi – Function Jigs has been fabricated and test for that purpose.

METHODOLOGY

To create good facilities for welding purpose, the process selection, fabrication and analysis has been conducted. Before run this project, selection of criteria and based on comparisons with others source has been conducted including design, cost and functionality of product. This project was fabricated accordingly from design drawing. While, for verified the structured design, the stress analysis method and welding non-destructive test for welding part has been proposed. The end product has per shown in **Figure 1**.

RESULT

The results of static stress analysis conducted in Autodesk Inventor shown in **Table 1**. While, for the welded part, from Dye Penetration Inspection and Visual Inspection show this structured has been successfully fabricated. From **Table 1**, it is obvious that the maximum stress **33.22MPa** has experienced from simulation are much lower than yield strength of material 210MPa. It also shown the result of small maximum displacement **0.1622 mm** and safety factor of sturucred **6.2** can accommodate than stronger 200N load. This low maximum stress and suitable value for safety factor for variable changing load case.



Figure 1 : End Product

Table 1 : Result of Static Stress Analysis

ITEM		DETAIL
Name	Steel	
	Mass Density	7.85 g/cm ³
Stress	Yield Strength	210 MPa
	Ultimate Tensile Strength	345 MPa
	Young's Modulus	210 GPa
	Poisson's Ratio	0.3
	Shear Modulus	80.7692 GPa
Load Type	Force	
Magnitude	200.000 N	
RESULT		

Von Mises Stress Analysis	33.22 MPa
Displacement Analysis	0.1622 mm
Safety Factor Analysis	6.23

CONCLUSIONS

In conclusion, the Multi – Function Welding Jigs has been tested and result acceptable to be implement as suitable facilities for our students conducting welding training session in Welding Technology Program at Vocational Collages. The Multi – Function Welding Jigs could be exploited for educational & training centre for purpose of welding training and test session. Not only that, university & research institute field could use as holder the welded specimen for structurer analysis. Other than that, company & private sector able to use in welding development & qualification purpose such as Welder Qualification Test (WQT), and Welding Procedure Specification Development.

ACKNOWLEDGMENT

The authors are pleased to acknowledge the Director of Kolej Vokasional Shah Alam, Persatuan Ibubapa & Guru (PIBG) KVSA, Surau Al – Falah, Kumpulan Inovatif & Kreatif, Mrs Liana Akmal Ramli, Unit Teknologi Kimpalan and all of KVSA's family for providing ideas, financial, and moral support for this project.

LAB WORK VIDEO (LWV): A TOOL FOR COURSE ASSESSMENT AND TEACHING AID IN UNDERGRADUATE PROGRAM

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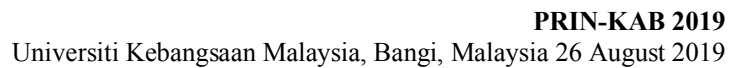
ABSTRACT

The lab work video (LWV) approach has been introduced in this study to improve the teaching experience of the undergraduate courses related to lab works. This approach has two main functions; (1) as a tool for course assessment by covering all the primary learning domains of cognitive, affective, and psychomotor; and (2) as a teaching aid to help the students to conduct the lab works independently. The LWV was successfully proven to be a useful tool as an overall assessing tool for the related lab work engineering courses. The prepared videos have also assisted the students of the next cohort to conduct lab works more independently without much guidance from the lecturer, technician, and demonstrator. As such, this study concludes that LWV is a practical and objective-driven approach, that is cost-free and can promote student-centered learning.

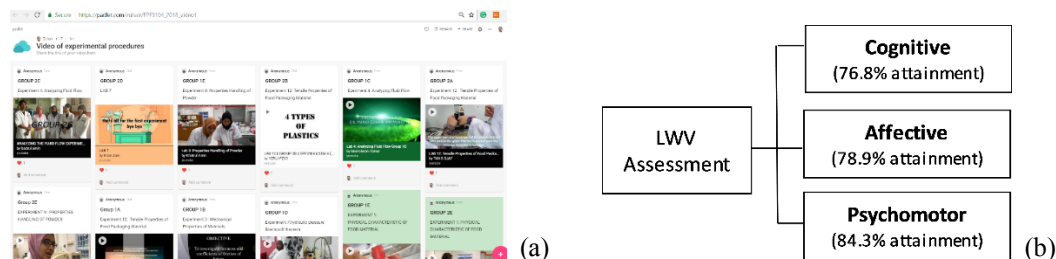
KEYWORDS: Assessment; Lab work; Teaching aid; Virtual learning; Educational video.

INTRODUCTION

The undergraduate program, especially in the engineering and science fields, comprises of courses related to laboratory works. These courses require the students to conduct around 10 to 12 laboratory works per semester in order to fulfil the requirements of the program. This mode, of course, is suitable and appropriate to expose the students on hands-on experience in doing experimental works while relating it with the theories learned in the classroom. However, a few limitations of this particular teaching mode have been identified, specifically in terms of the assessment mean and teaching approach. Mostly, the assessment of this type of courses will be based on the weekly lab report written by the students. The lab report typically consisted of the elaboration of the experimental backgrounds and procedures, as well as the discussion of the obtained results of the lab work. This type of assessment is useful to measure the cognitive ability of the students. However, evaluation of other learning domains such as affective and psychomotor is somewhat limited. One method to incorporate these domains in the assessment mean of the course is to assign the students with lab video making task. Besides experimental procedures, the video consists of the related theory and findings as well. Based on this approach, the lecturer can evaluate the overall performance of the student, which includes the cognitive, affective and psychomotor domains, through the video by referring to the prepared rubric. Also, the task might be considered as one of the teaching strategies for the student-centered learning (SCL) approach, in which the students become the key players in a session of learning and teaching. The prepared videos can be a great guide to equip the students of the next cohort, who will be undergoing a similar course and perform the same lab works with a deep understanding of the lab experiment. This approach will significantly help in minimizing the dependency of using demonstrator. Currently, the lab works are conducted by lecturers, technicians, and demonstrators. The demonstrators are usually post-graduate students who received financial support from the university. Due to university budget constraints, which subsequently decrease the number of university-sponsored post-graduate students each year, the implementation of the lab work course is complicated and confusing. Hence, the use of LWV is considered as an alternative to solve the issue by offering a new dimension of virtual experience to the students before they proceed with the real lab works. This teaching approach is more simulative and attractive for the students with the incorporation of information technology as compared to that of the conventional method, which depends on the lab work manual and demonstrator instructions. The lab work video (LWV) may encourage the students to be more independent



METHODOLOGY



Questions	Evaluation (%)				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I already knew the related laboratory techniques, even before watching the videos	0	35.7	53.3	10.7	0
The videos are simple, clear and can be easily understood	0	0	7.1	64.3	28.6
The videos assist me in visualizing the experimental setup easily before I even start the lab works	0	0	3.6	46.4	50
The videos assist me in relating the theories I have learned in the class with the lab works	0	3.6	25	53.6	17.9
The videos help me to execute the experiments properly	0	0	0	67.9	32.1

By watching to the videos, I can conduct the lab works independently, without relying much on the lecturer and demonstrators	0	7.1	46.4	39.3	7.1
The videos help me to be more confident in conducting the lab works	0	0	17.9	60.7	21.4
The videos help me to be more motivated and excited in doing the lab works	0	3.6	14.3	67.9	14.3
The videos help me to be more prepared with the outcomes of the lab works	0	0	3.7	70.4	25.9
The videos help me to finish the lab works faster than using the lab manual alone	0	0	17.9	60.7	21.4

CONCLUSION

The LWV has been successfully utilized as a mean of assessing the student since it covers all the primary learning domains of cognitive, affective, and psychomotor. The LWV can also be further used a teaching aid in helping the students of the next cohort to conduct lab works more independently without much guidance from the lecturer, technician, and demonstrator.

INNOVATIVE TEACHING OF ANTHROPOMETRIC THROUGH MORPHOSIS-DUAL FUNCTION CHAIR DESIGN AND BUILD

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ABSTRACT

This research is about innovative teaching methodology and learning process of anthropometric study using “Morphosis Dual-Function Chair Design and Build”. The objectives of the study are to develop their knowledge in anthropometrics and ergonomic study and to familiarise first year architecture students about functional requirement and creative aspects of design. The teaching methodology starts with the brief formulation, brief overview, design critique sessions, product making and presentation. A survey on students’ feedbacks on their learning outcomes was conducted and the findings were analysed to establish students’ understanding of the project’s objectives. In conclusions, both objectives have been achieved. Furthermore, students have also learned about teamwork and construction method.

KEYWORDS: Anthropometric; Innovative; Morphosis; Functional, Chair Design

INTRODUCTION

In architectural education, design course considered as the most important course. Students discover various architectural language, skills and creativity through design course (Ham.et. al, 2004). Since the beginning of 20th century, pedagogy of architectural education has been varying to meet students Gen Alpha needs (Farivarsadri, 2001). Design course instructors required to come up with new teaching techniques to disseminate architectural knowledge. In this quest, the most emphasised place is first year architecture studio due to the course content (Ozorhon, et. al, 2016). Part of the main aims of the first year design courses are to make students understand anthropometric and ergonomic, design languages, and prepare students to handle architectural problems in creative way (Ozorhon. et.al, 2016). According to Dikmen (2011) first year design studios is the most challenging course for students and instructors. Therefore, this research has introduced new teaching method, which requires the students to design ‘Morphosis Dual Function Chair’ and build it at 1:1 scale model. The objectives were to familiarise students with the functional requirement and creative aspects of design and to develop students’ knowledge in anthropometrics and ergonomic study.

PRODUCT DEVELOPMENT

The teaching methodology of an innovative teaching process is formed based on the objectives (Figure 1). It starts with brief preparation, brief introduction, design critique sessions, product making, presentation (Figure 2) and ended with the analysis of students’ learning outcome.

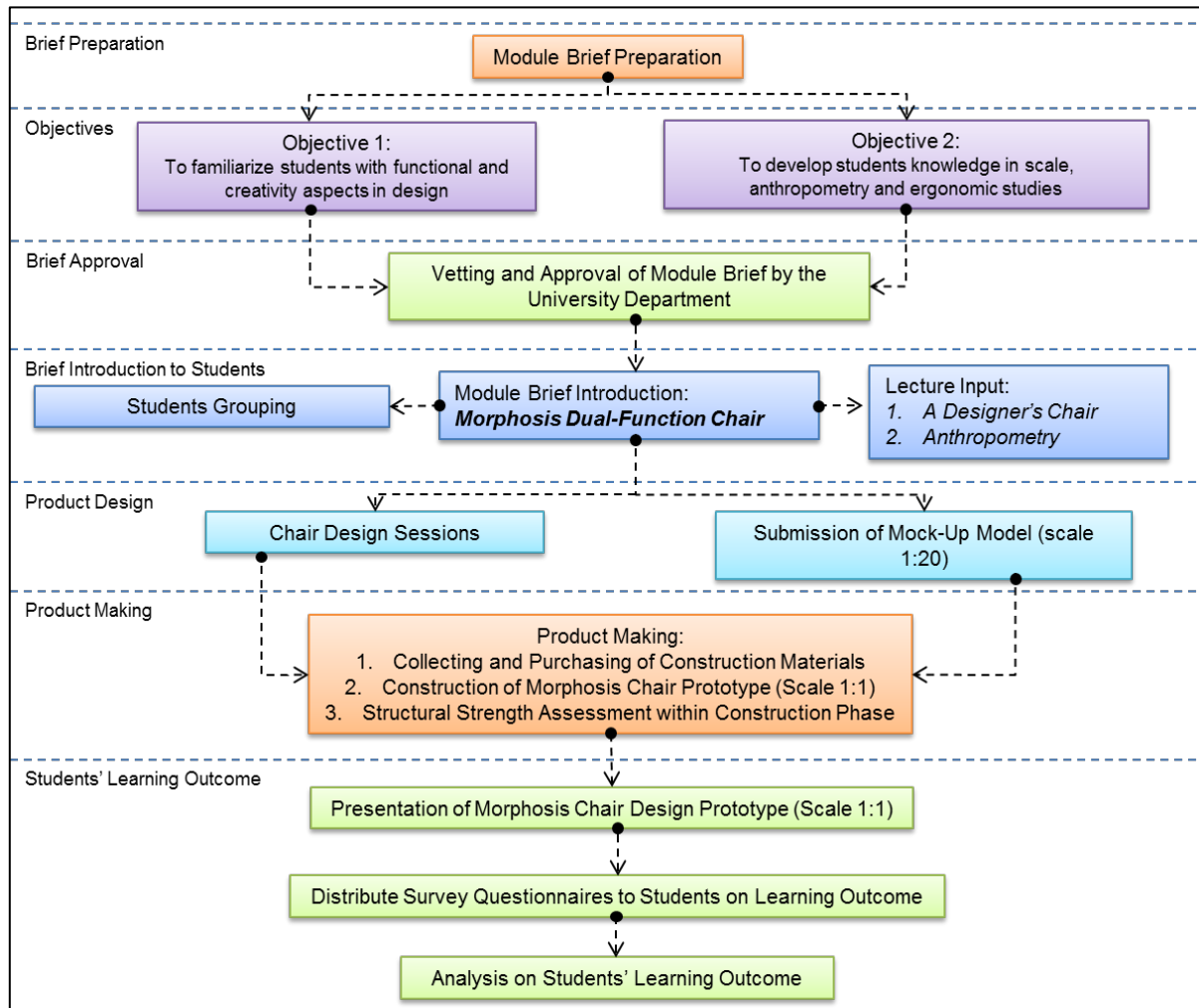


Figure 1. Learning Process for Morphosis Dual-Function Design.

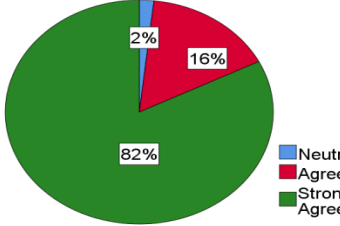
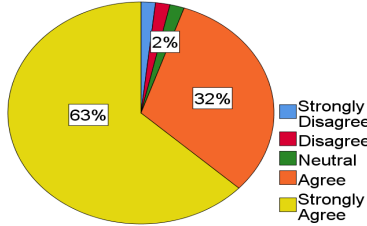
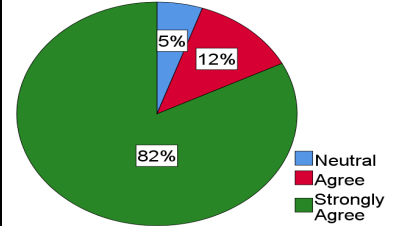
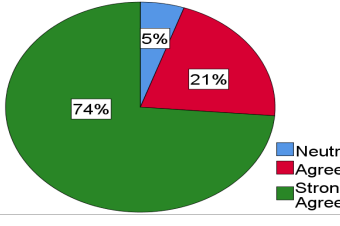
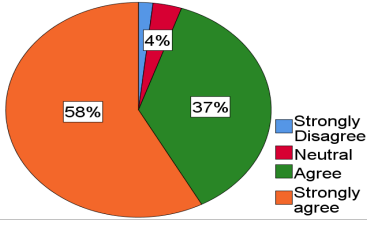
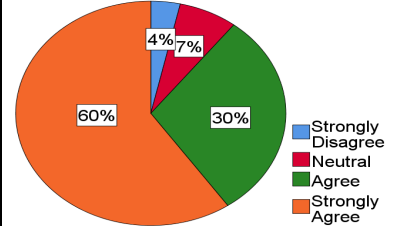


Figure 2. Product making sessions and examples of “Morphosis Dual Function Chair” prototypes.

STUDENTS’ LEARNING OUTCOME

Students’ learning outcome was assessed through survey questionnaires upon the completion of the Morphosis Dual-Function Chair. The survey consists of 6 questions and 1 comment section for additional learning outcome. The survey was carried out with 63 students and the results show rather positive feedback (Table 1). In Question 1, 98% of the students agreed that functionality is an important aspect in creative design and in Question 2, 95% of the students finds the project has helped developed their creative skills and thinking, Furthermore, in Question 3, 94% students agreed that the project has enhanced their knowledge on anthropometric study.

Table 1. Students' Responses on Learning Outcome

 <p>Q1. Functionality is an important aspect in creative design.</p>	 <p>Q2. The project helps to develop my creative skills and thinking.</p>	 <p>Q3. The project has enhanced my knowledge and awareness on human scale, anthropometry and ergonomic.</p>
 <p>Q4. The project assists me to develop workable and functional full-scale model of the chair.</p>	 <p>Q5. The learning experience of designing and building the Chair is valuable as teamwork.</p>	 <p>Q6. This learning experience of designing and building should be continue</p>

In addition to the above findings, 95% of the students improve their knowledge in construction, 95% finds it was a valuable project in terms of teamwork, and 90% think the project should continue for first year architecture studio (Table 1).

CONCLUSION

In conclusions, both objectives have been achieved. Evidently, 'Morphosis Dual-Function Chair Design and Build' has actually helped students to understand and familiarise themselves with the functional and creative aspects in design. Furthermore, the students have developed knowledge in anthropometrics and ergonomics study. Consequently, the students also learned about teamwork and construction.

REFERENCES

- Dikmen, Ç.B. (2011) e-Journal of New World Sciences Academy Engineering Sciences, Volume: 6, Number: 4 pp. 1509-20 [The Importance of Studio Works in Architectural Education: Basic Education Studios].
- Farivarsadri, G. (2001). A Critical view on pedagogical dimension of introductory design in architectural education. *Architectural Education Exchange*, 2001, 11-12.
- Ham, J. J., & Arch, B. (2004). *On Representation and Construction in a Tectonic Design Studio*. Deakin University, Victoria.
- Ozorhon, G., Tokay, S., & Hacıhasanoglu, O. (2016). Design In /Designing the First-Year Studio: An Experimental Study. *Arts and Design Studies*, 40, 51-62.

i-RBin

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ABSTRACT

Bluetooth module is a practical type device which is able to receive and transmit information via Bluetooth network within the IoT devices that operates based on wireless networks bluetooth connection. A combination of Microcontroller (Arduino) ,motors as well as bluetooth modules eventually became a project that could help in the separation of waste more easily.

KEYWORDS: Arduino; Bluetooth; Iot; Motors

INTRODUCTION

The dumping of garbage in the country is so alarming that waste products cannot be separated such as plastic, cans and even paper. This can trigger bad symptoms such as air pollution as well as the spread of disease through polluted air and also eliminate flora and fauna. The objective of this project is to prevent waste from scatters everywhere and to raise awareness among young people about the importance of caring for the environment and also hygiene.

PRODUCT DEVELOPMENT

The project is built using the methodology as follow.

HC-06 Bluetooth Module

The HC-06 is a class 2 slave Bluetooth module designed for transparent wireless serial communication. Once it is paired with a master Bluetooth device such as PC, smart phones and tablet, its operation become transparent to the user. All data received through the serial input are immediately transmitted over the air.

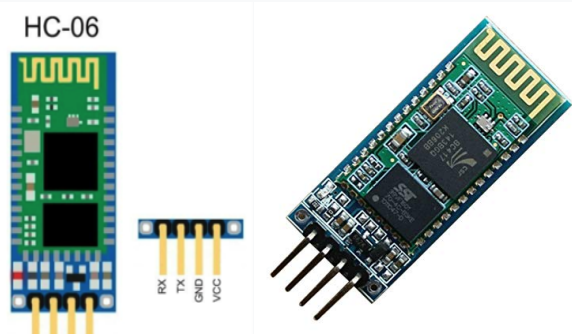


Figure 1. HC-06 Bluetooth Module

Servo Motors

The servo circuitry is built right inside the motor unit and has a positionable shaft, which usually is fitted with a gear (as shown above). The motor is controlled with an electric signal which determines the amount of movement of the shaft.



Figure 2. Servo Motors

Arduino Mega Microcontroller

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560 (datasheet). It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega is compatible with most shields designed for the Arduino Duemilanove or Diecimila.



Figure 3. Arduino Mega Microcontroller

LCD Display

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. ... A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD.



Figure 4. LCD DisplayElectronic Circuit

Electronic Circuit

The connection between Arduino Microcontroller, Servo Motors, LCD and Bluetooth Module device.

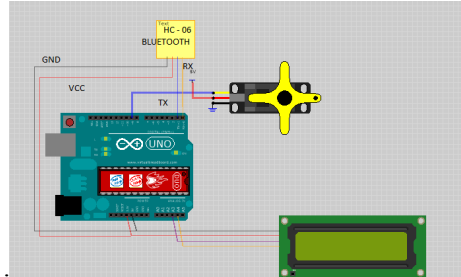


Figure 5. Electronic Circuit

CONCLUSIONS

The Bluetooth module can act as a receiver and a transmitter to read, send information to the microcontroller. At the end of the project, the objective to had been achieved.the objective of this project is to raise awareness among young people about the importance of caring for the environment.

TRANSMISSION LINE THEFT PROTECTION DEVICE BASED ON MICROCONTROLLER AND GSM

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ABSTRACT

GSM modem is specialized type of modem which is similar to a mobile phone that operates over subscription based wireless networks. A transmission line comprised of a system of interconnected elements, each individually designed to satisfy its respective requirements, both in technical and statutory aspects. The most important component of a transmission line is the steel tower. Stolen tower parts such as bracing steel will cause tower instability, buckling of main legs resulting from inadequate slenderness ratios of the steel member and eventual collapse of the towers. The combination between GSM and Arduino Microcontroller is eventually project that can prevent the stolen bracing steel.

KEYWORDS: Transmission line; Arduino; GSM.

INTRODUCTION

Many incident relevant to the stolen bracing steel tower of the transmission line. Incident that happen in Bukit Rambai Power Station and Tangga Batu at Melaka. The tower, which carries 132 kilovolt (KV) lines, collapsed after thieves carted away its bracing steel. To prevent thieves from stealing steel tower support, TNB had been take initiative way to increase a surveillance patrol around transmission tower in suspected area. The objective of this project is to increase the protection of the transmission line tower and to prevent incident of tower collapse. We also can accelerate the sending information when transmission tower in problem. We also can decrease the problem of the stolen bracing steel tower.

PRODUCT DEVELOPMENT

The project is built using the methodology as follow.

GSM Device

GSM is known as Global System of Mobile Communication. This project used GSM type of SIM900A. This GPRS/GSM module is a breakout board and minimum system of SIM900A Dual-band GSM/GPRS module. It can communicate with controllers via AT commands (GSM 07.07 ,07.05 and SIMCOM enhanced AT Commands). The interface is via UART/Serial. This module supports software power on and reset. High quality antenna is built for better signal reception.



Figure 1. SIM900A GSM Modem

Electronic Circuit

The connection between Arduino Microcontroller, 5V Buzzer, Switch and GSM device.

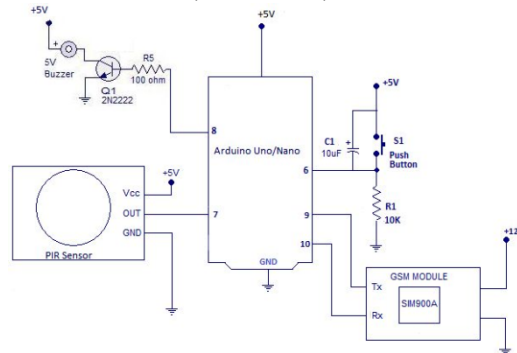


Figure 2. Electronic Circuit

PIR Sensor

The detecting range and response speed can be adjusted by 2 potentiometers soldered on its circuit board, The response speed is from 0.3s - 25s, and max 6 meters of detecting range.



Figure 3. PIR Sensor

Arduino Microcontroller

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.



Figure 4. Arduino Microcontroller

CONCLUSIONS

The GSM modem can act as a receiver and a transmitter to read , write, sending and reply SMS messages. At the end of the project, the objective to increase the safety level in the substation tower had been achieved. By using this project, the stolen bracing steel case can be reduced. This project is easy and had been used the SMS only about something happen a part from us.

CONCEPTUAL DESIGN OF PIT-OPENER IN AIRPORTS FOR PREVENTION OF BACKPAIN AMONG GENERAL WORKERS

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ABSTRACT

The present invention generally relates to design improvements of a pit opener, particularly to a pit opener with a handle, stowage bracket and body support. Airport oil pits are covered, requiring a special pit opener to open the lid. After using the pit opener, there is no designated place to store the pit opener. The existing practice is that workers will throw the pit opener onto the ground or lorry after use. This causes the pit opener to be bent, broken and possibly missing during operation. The present invention of the Pit-Opener (DAG) comprises a flexible hook at one side and a fixed hook at the adjacent side. The body was designed as rugged as possible and hard to break because it is made using thick steel, which is carbon steel size 40mm. The flexible hook will be placed accurately to lock at one side of the lid. Then the fixed hook is adjusted on the other side of the lid. Once both Flexible and Fixed Hook are locked, the lid can be turned to unlock the lid of the pit. The handle of the DAG is used to hang/store DAG easily. Workers can hold the DAG by hand and put it into the designated area to open the lid. Every DAG will have a dedicated Stowage Bracket and Body Support for safe keeping on every oil tanker which will be safe and secure for easy usage. The height level was designed to be ergonomic to the level of standing position. Overall, DAG provides vital, safe and secured storage for efficient pit opening in airports.

Keywords: Pit opener, design, invention, airport use.

INTRODUCTION

Lower back pain is common among workers who have to lift or pull heavy weights or who lift frequently, even if the loads are not heavy. It is also common among workers adopting awkward postures, particularly twisting and bending. These exposures are found at all airports, and would explain the prevalence of lower back pain among airport employees.

During routine chamber inspections, the plant Operation Specialist (OS) has to manually open manhole covers and access the manholes. They have to insert the cover key and manually lift the manhole cover, which amounted to 60kg per manhole. There will be hazards involved by manual lifting, as it will cause the risk of musculoskeletal injuries, the risk of falling and dropping heavy objects. Calgary noted that the universal manhole opener uses long steel with a stepper on the base of the steel and a hook to pull away the manhole from its place. By using this item, it helps prevent back injuries caused by the traditional method of using a pick and pure force. In addition, the lever action will effortlessly lift and pull the cover from the manhole, the unique design features on hook, and shoe prevents the tool from slipping down. Poniewierski J. (2018) had shown that it is a skill to juggle many competing factors and come up with good designs. In the context of safety, a good design can contribute to the safety of an operation. A poor design may add unnecessary safety risks. Therefore a suitable design must be done for a Pit-Opener which is efficient to do its functions as required for all related activities in lifting, opening and closing the pit cover.

THE INVENTION

Innovation of the tool comes with a Pit-Opener (DAG), Stowage Bracket and Body Support at the oil tanker. The present invention, namely, DAG comprises a flexible hook at one side and a fixed hook at the adjacent side. The Flexible Hook will be placed accurately to lock at one side of the lid. Then the Fixed Hook is adjusted on the other side of the lid. Once both Flexible and Fixed Hook are locked, the lid can be turned to unlock the lid of the pit. The handle of the DAG is use to hang / store DAG easily. Workers can hold the DAG by hand and put it into the designated area to open the lid. The handle of the DAG is to keep the DAG on the tank oil after use. Every DAG will have a dedicated Stowage Bracket for safe keeping at every oil tanker and hold the DAG after use. This will keep DAG safe and secure for easy usage. The height level has been ergonomically designed, which is the same level as the human while standing. A Body Support will keep DAG in its place as it limits the movement of DAG during movement of the oil tanker.

CONCEPTUAL DESIGN AND MATERIAL SELECTION

The Pit-Opener (DAG) was designed by integrating engineering aspects and ergonomic concepts, with workers in mind. The product not only solves the problem of opening the pit cover in airports efficiently, but also considers a safe operating procedure for workers, as well as prolonging the life span of the product. This impact prevention is achieved by having a stowing hook on the vehicle to place the product after use. Figure 1(a) shows a sketch of the actual product along with the specific product dimensions. The 3D CAD drawing of the Pit Opener DAG is illustrated in Figure 1(b). Figure 2 shows the drawing of the stowage bracket that functions as the dedicated place to keep the DAG on the tank oil after use. Figure 3 illustrates the drawing of the body support that helps keep the DAG in its place on the vehicle.

The material selection for the product was made based on the requirement to withstand a static load of 10 kg and economic reasons. Carbon steel, which is the most common material used for products that have reasonable strength and toughness, was selected. The material is thought to be the best selection since the load (pit cover) that the product needs to withstand is 10 kg. Furthermore, the material is not expensive, while fulfills all the requirements needed to operate its intended function. The body was designed as rugged and hard to break because it is made using thick steel which is carbon steel size 40 mm.

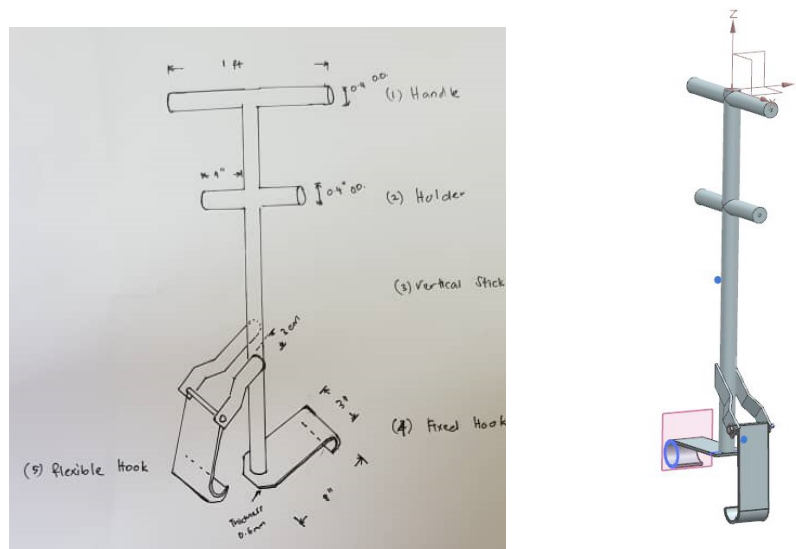


FIGURE 1: Pit-Opener (DAG) (a) Sketch and (b) 3D CAD drawing

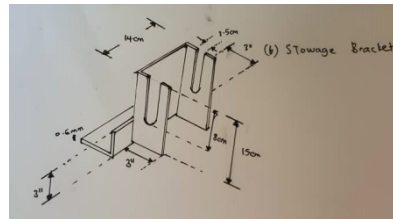


FIGURE 2: Stowage Bracket

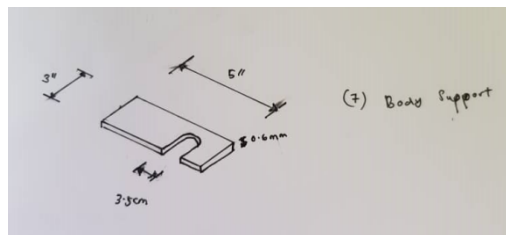


FIGURE 3: Body Support

CONCLUSION

The Pit-Opener (DAG) has been invented to solve the problem of lid opening of oil tanks at airports. The invention is not only easy to use, but also safe, ergonomic and durable for long term applications. Furthermore, the improvement in the existing design has assisted in proper storage of the product on the vehicle. In conclusion, DAG is an engineering solution for enhancing the safety and efficiency of pit opening for airport workers.

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REFERENCES

- Carolina N., Beach W. P., & Carolina N. N.D. North America – Canada.
- Co C. T., & Calgary S. S. W. N.D. How To Open How To Close. (403), 2–3.
- Hercules T., Dhcs K., Soon W. T., Chan E., Wong M., & Wong E. 2017. Wsh Innovation Awards 2017 (Manufacturing) Team: Hercules - Keppel Dhcs Pte Ltd Project: Multi-Purpose Lifter.
- National Precast Concrete Association. 2012. Manhole Casting Reference Guide, 2-10.
- Poniewierski J. 2018. Guidelines And Considerations For Open Pit Designers. Deswik Delivering Mining Efficiency, (March), 16.
- Roskam E., & Roskam E. 2018. The Insecurities Of Service: Airport Check-In Workers. Excess Baggage, (41), 1–20.
- Tech Notes. 2013. Manhole Invert Channels: An Overview, 1-5.
- United Utilities Wastewater Developer Services And Planning. 2016. United Utilities Site Sewer Construction Guide, 1-15.

ASSESSING THE SAFETY BEHAVIOUR OF EXPRESS BUS DRIVING CONDITION FROM PASSENGERS' PERSPECTIVE

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ABSTRACT

This paper presents the passengers' perspective towards express bus safety issues based on the driver's behavioural characteristics, providing an important aspect in reducing the accidents in Malaysia. A pilot study with a respondent of 40 people with aged between 16 to 41 years old were conducted in Universiti Kebangsaan Malaysia. The developed questionnaires were based on the five-point Likert Scale were implemented to assess the safety perception on express buses, and it has a higher reliability of Alpha Cronbach's score at 0.913. Consequently, the percentage that agreed dangerous behaviour of express bus drivers were mainly due to the use of mobile during driving (63.33%), tailgating (57.58%) and driving above the given speed limit (48.59%). It was due to insufficient time to stick to running schedules and the shift pattern rotations. In terms of safety precautions, about 77% passengers preferred safety briefing using audio due to its ease in understanding the meaningful instruction. In addition, 97% passengers agreed on the needs of a second driver to ensure a safe journey to their destination. Hence, a proposed mitigated solution such as drivers monitoring is needed by the respective agencies to reduce this careless behaviour that may influence the dangerous driving behaviour.

KEYWORDS: Express bus safety; Bus driver; Bus passenger; Bus accident; Public transport

INTRODUCTION

Express bus is an important mode of transport as it has a high connection between cities and is cheaper compared to trains and flights. The Malaysian Institute of Road Safety Research (MIROS) reported that a total of 1855 bus accidents occurred between 2012 and 2015. High profile express bus accidents and casualties affects the public view and confidence to use the transport (Solah et. al, 2013). Express bus safety factors include technical component failures and human errors. Recent progress has been made to increase the safety of express bus such as the use of GPS and cameras to track driving speeds and driver condition. Assistive Driving Aids (ADA) have also been integrated in the latest express bus models such as blind spot view and brake assist. By increasing the safety of express bus, will encourage the public to shift from private to public transport. Recent progress has been made with the use of 3D-modeling technologies to increase safety (Eliseev et. al, 2017). The effect of these new technologies to increase express bus safety on the public confidence and perception on express bus safety are not yet clear. Therefore, the objective of this study is to investigate the perception of bus users' towards express bus safety and determine the main criteria to increase express bus safety. The scope of the research is limited to the survey of Universiti Kebangsaan Malaysia (UKM) students to obtain early perceptions on bus driving safety behaviour. The expected outcome of this work is to understand express bus drivers' behavioural characteristics based on the passenger's perspective for an express bus and consequently to aid reduce the number of express bus accidents in Malaysia.

SURVEY DEVELOPMENT

This study was done at Universiti Kebangsaan Malaysia (UKM) main campus in Bangi, Selangor. The study focuses on both male and female of UKM Cohort, involving students, staffs and visitors. A total of 40 questionnaires were distributed in the pilot study. The respondents were chosen among UKM Cohort due to some reasons that the results of this pilot study is made as a point of reference for the main survey and to obtain early perceptions on bus driving safety behaviour as well as education level related to bus driving. A study suggests that 30 representative participants from the population of interest is a reasonable minimum recommendation for a pilot study where the purpose is preliminary survey or scale development (Sahay et. al, 2015). As presented in Figure 1, 40 of the total respondents were involved to participate in this study, i.e. 31 of the respondents are UKM students, six are the UKM staffs and the remaining respondents were visitors to UKM on the day of this survey.

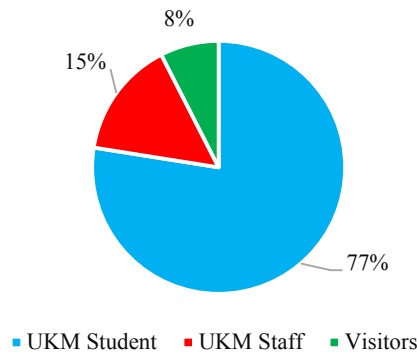


Figure 1. Respondent classification in questionnaire distribution

These three sections are; Section A- Demographic information of the bus express respondents, Section B-Safety of express bus and Section C- Education on safety of express bus. Sections A defines the demographic information of the bus express respondents that consists of the multiple-choice question category. Section B (Safety) and C (Education on Safety) comprises a Likert scale question category based on a five-point Likert Scale to assess the perception on safety of express buses, i.e. *strongly disagree (1)*, *disagree (2)*, *satisfactory (3)*, *agree (4)* and *strongly agree*.

FINDINGS

These highlighted factors for dangerous behaviour of express bus drivers were categorized into three aspects; highly dangerous behaviour, medium dangerous behaviour and less dangerous behaviour. The percentage of dangerous behaviours exhibited by the express bus drivers are shown in Figure 2.

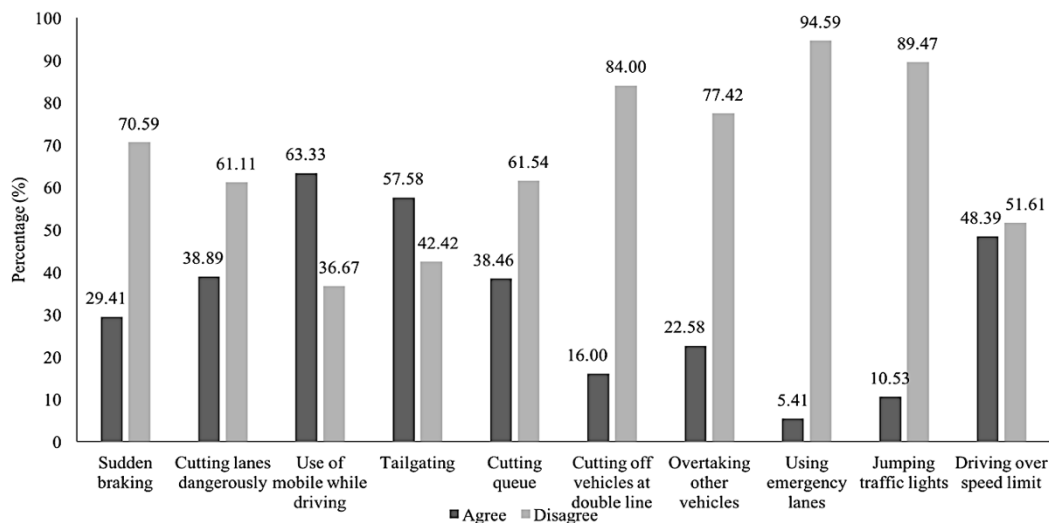


Figure 2. Dangerous behaviours exhibited by express bus drivers

Figure 3 shows the learning techniques preferred by the passengers and their awareness regarding express bus safety. Based on the findings, majority of the respondents preferred the safety briefing performed through audio (77.42%) as compared to video means (64.52%). It can be explained by the ease and practicability of using audio instructions in buses. Furthermore, 83.33% of the respondents indicated that they are aware about the safety help line to be contacted during emergency, while a high number of respondents agreed on the need for a second bus driver (97.44%) to ensure a safe journey to their destination. These results show that the express bus passengers' awareness level on safety is considerably high. However, more initiatives for education on express bus safety are recommended to further improve these percentages. For example, more information on the safety help line should be disseminated to the public so that the percentage of respondents that do not know about the safety help line (16.67%) can be ultimately reduced.

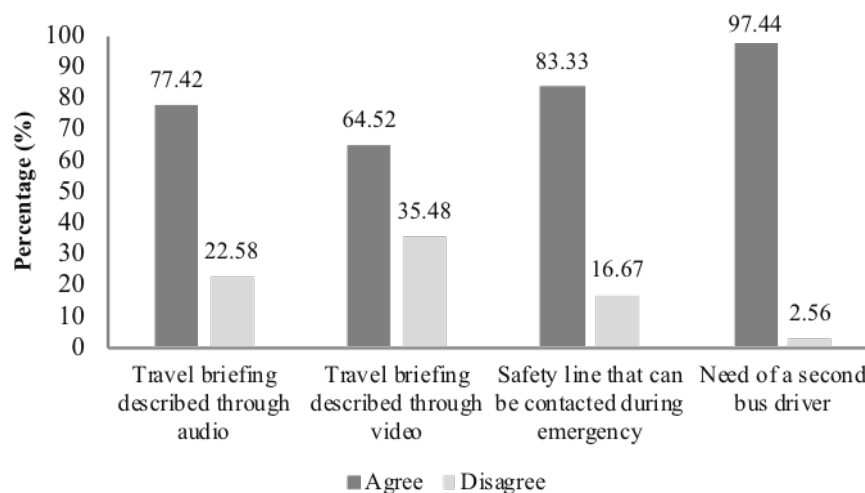


Figure 3. Respondents' perception towards learning and awareness on express bus safety

CONCLUSIONS

Road accidents with fatal and non-fatal casualties involving express buses has become an alarming issue in Malaysia with an increasing number of accidents involving these vehicles recently. Results from the passenger's feedback showed that using mobile while driving, tailgating and driving over the given speed limit has the most direct influence on accident risk. From the safety feedback, the passengers preferred the safety briefing to be

address through audio with a visible help line to ensure a safe journey to their destination. Hence, it is recommended that regulated governing body policy on bus safety programme is necessary to ensure the drivers monitoring is necessary as it could forewarn drivers of their risky behaviour.

ACKNOWLEDGMENT

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REFERENCES

- Eliseev, M., Tomchinskaya, T., Lipenkov, A., & Blinov, A. 2017. Using 3D-modeling technologies to increase road safety. *Transportation Research Procedia*, 20, 171-179.
- Sahay, A., Hutchinson, M., & East, L. 2015. Exploring the influence of workplace supports and relationships on safe medication practice: A pilot study of Australian graduate nurses. *Nurse Education Today*, 35(5), e21–e26.
- Solah, M. S., Ariffin, A. H., Isa, M. H. M., & Wong, S. V. 2013. In-depth crash investigation on bus accidents in Malaysia. *Journal of Society for Transportation and Traffic Studies*, 3(1), 22-31.

IMPERATIVES & EFFECTIVENESS OF THE INTERACTIVE MOOC LAA350 (INDEPENDENT LANDSCAPE DESIGN)

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ABSTRACT

MOOC LAA350 was initiated to self-directed the design-studio courses into an online- learning platform. This interactive design-based module offers lectures, demonstrations videos, reading materials, activities and quizzes in conducting the comprehensive online-learning environment. In order to prolong the novelty of this interactive teaching aid, this study has initiated a post-evaluation-test through a google doc-survey distributed among the registered candidate of the module MOOC LAA350. The aim is to investigate the effectiveness of how this module has benefited the student's ability and competency in delivering their independent landscape projects successfully. The objective was to (i) measure the frequency of student's engagement; (ii) evaluate the significant interest and imperatives; and (iii) identify preferences and suggestions towards future improvement and further enhancement. The findings showed overwhelming participation of 116 occupied respondents from a total of 154 registered candidate. This 75% of responses showed a positive ambience of this initiative. Therefore, this module is significant in presenting the usefulness of how an interactive machine learning tool is sufficient in assisting a landscape design projects from the initial setting towards the final accomplishment, as what design projects and a professional Landscape Architect requires.

KEYWORDS: MOOC LAA350, independent, landscape, design, project

INTRODUCTION

The contemporary teaching and learning phenomenon of the massive open online course (MOOC) is relatively a new blooming online-learning that has significantly assists the conventional face-to-face supervision. Ultimately, there is the potential for continuous improvement in the educational products that provide valuable information to all parties.

The platform provided by MOOCs can facilitate the design faculties to explore references and learn from samples, which help in improving knowledge, skills and creativity. As the course of Independent Landscape Design requires a continuous design development, this MOOC LAA350 is aims to inspire and equip the candidate with landscape designer competency in solving site environmental issues until proposing a landscape design solutions through both graphically and technically independent design presentations .

Therefore, in order to measure the usability of MOOC LAA350 imperatives, this study has conducted an e-survey to investigate the engagement and effectiveness of self-directed learning tools among the candidate. The survey also measures the interest, preferences and suggestions towards future considerations.

PRODUCT DEVELOPMENT

MOOC LAA350 was developed since year 2017 and was officially published in September 2018. This mooc consists of four modules including; (i) Introduction of Independent Study; (ii) Site Planning & Design Development; (iii) Construction & Documentation and (iv) Portfolios & Design Samples. The example of product interface are as Figure 1.



Figure 1. Example of the online learning interface

This module offers further aid to the students to dive into various design strand including heritage and historic cities, cultural landscape studies, waterfront landscape, resorts landscapes, rehabilitation and therapeutic landscape together with park and community design.

MEASURING THE MODULES ENGAGEMENT & EFFECTIVENESS

In order to investigate the responses and effectiveness of this MOOC ILD 350, a simple survey through Google-doc survey has been conducted and distributed within the final three weeks before the semester end to the students who has enrolled with this online module. This survey has accumulated a total respondent of 116 from the 154 registered candidate. The 75% of the participations showed a positive ambience of this initiative. The summary of findings are as Figure 2.

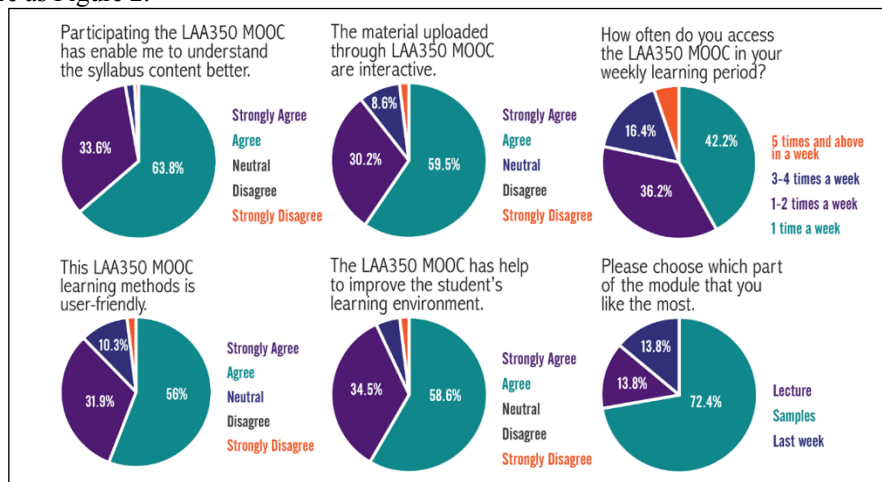


Figure 2. Results from the e-survey among the MOOC LAA350 candidate

Based on the e-survey findings the pie chart illustrated that; (i) majority of the respondent (with 52.6%) highlighted that they frequently access the modules several times a week; (ii) 97.4% of the respondents agreed that MOOC LAA350 has enable them to understand the syllabus content better due to its interactive interfaces

and user friendly buttons; (iii) the percentages of respondents who agrees for interactive interfaces is 89.7%, while the user-friendly are 87.9%; (iv) amongst all module, 72.4% of the respondents have rated that the interactive boards samples uploaded are the most favourite module for MOOC LAA350. These findings are significantly high in representing the usefulness of the modules.

Hence, it is not surprising that 93.1% of the respondent agree that MOOC LAA350 has successfully improve the students learning environment as well as promoting the interactive educational information especially related to landscape design spectrum that suitable for Diploma level.

CONCLUSIONS

Based on the e-survey findings, it is therefore evidenced that MOOC LAA350 is a significant platform that successfully engaged students and guided them in moulding their understanding, graphic presentation skills as well as technical aspect related to design developments and constructions. This conclusion showed an overwhelming contribution of online learning platform assisting the conventional teaching method. Therefore, this module are sufficient and reliable in fulfilling the student's needs towards accommodating the current trends of Education IR 4.0.

ACKNOWLEDGMENT

We are grateful for the opportunity, knowledge-sharing and workshops provided by iNED UiTM Perak Branch in supporting the MOOC design, development and implementation throughout the year 2018 - 2019.-

NAVHEALTH @ INFO APPS[®]: A PERSONAL HEALTHCARE FACILITIES NAVIGATION APPLICATIONS

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ABSTRACT

A virtuous healthcare facilities and accessibility system in developing countries are mostly located in urban or semi-urban areas rather than in rural areas, triggering tiresomeness to the residents to reach closest healthcare centres. Therefore, an innovative geospatial applications has been developed in this innovation towards modernising and revolution of healthcare systems in rural areas of Selangor, Malaysia. The framework of geospatial functions and software development life cycle (SLDC) were implemented to create the proposed applications or apps. Survey on the selected local respondents revealed that 80% of them are unsatisfied with the existing apps performances. Thus, this proposed mobile apps or NavHealth@Info Apps has provided important modules and elements of geospatial and cartographic design for users' applications in searching ideal healthcare centres geoinformation during emergency or urgency cases. The main modules in the apps are healthcare info, health info and general info, and the elements include map, database, health care centres information, health information and accessibilities information. This personal apps system also offers spatial network analyses to assist the local community to find an optimum accessibility to reach idyllic healthcare centres especially in peak time.

KEYWORDS: NavHealth@Info Apps; Healthcare Facility; Network and Accessibility; Geospatial Mobile Apps; Semi-Urban Areas.

INTRODUCTION

Mobile applications or mobile apps are software programs developed for mobile devices such as smartphones, mobile books and tablets. They turned mobile devices into miniature powerhouses of function and fun (Viswanathan.2017). Viswanathan.(2017) also added that the purposes of these apps run the gamut, with purposes not limited to utility, productivity, and navigation but also to entertainment, sports, fitness, and just about any other imaginable daily activities. The common mobile apps are usually available to be downloaded via mobile operating platforms, either Apple App Store, Google Play, Windows Phone Store or Blackberry App World which can be free downloaded or in-apps purchases. They also generally offer productivity and information retrieval, such as email, calendar, contacts, a stock market and weather information.

Health and technology advancement have a correlation. Health and well-being are the most important element in human life for longevity. The combination of a healthy diet and a well-practiced of exercise in daily routine are not limited to maintaining a good health, but also to prevent any complex diseases infection and to reduce high medical cost. Although healthcare facility has rapidly grown from time to time, the handling capacity is still insufficient for people around the area. Therefore, the solution for finding healthcare services must be taken seriously from different perspectives. This innovation focuses on the development of a mobile application with unique functions to provide users with geoinformation on healthcare facilities.

This invention has demonstrated how smartphones and mobile electronic devices such as tablets and Ipad have transformed daily communication lifestyles. It is recorded that three-quarters of world population expected the mobile apps to be free, and their willingness to pay for apps are varied by several categories including technology, finance, travel, social, entertainment, and retail (Shen, et al., 2016). Thus, the development of a mobile application will be able to provide information on direction, location, and cost-estimation of the chosen healthcare facility, and then making it easily accessible to the public.

PRODUCT DEVELOPMENT AND UNIQUENESS OF NAVHEALTH@INFO APPS

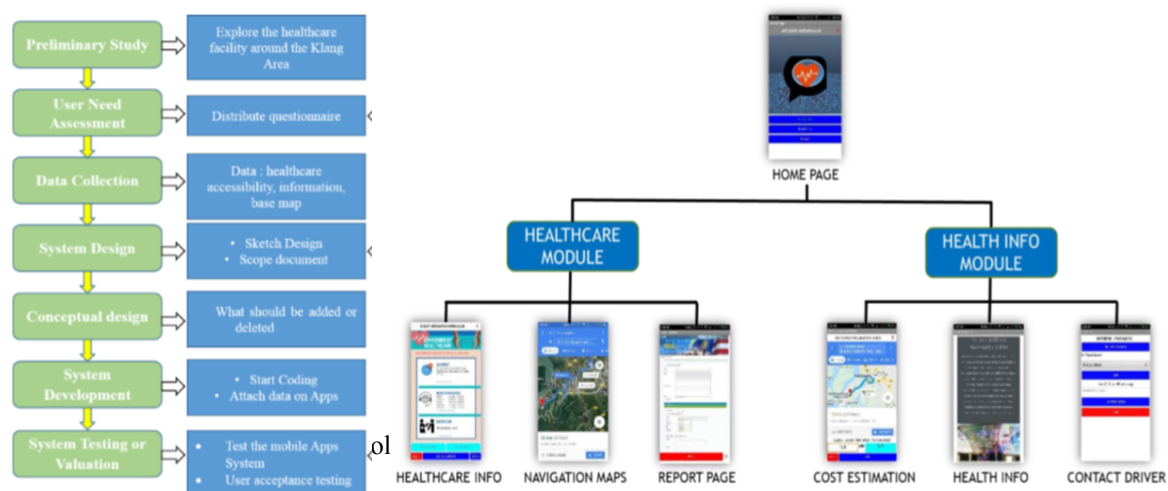
The methodology utilized in the invention consisted of several stages as presented in Figure 1. These stages used the framework of Software Development Life Cycle (SDLC), including user requirement, system design and development, system testing and implementation. SDLC assisted the inventor in establishing a proper step in apps development with an organized procedure. This innovative product was practically developed in Pulau Indah, Klang since this area is currently only has a small and limited-service government clinic.

Constructive User Requirements for the Proposed Mobile Apps

In terms of demography, seven residential communities involved in the survey to examine their issues and possible solution in local healthcare condition. The residents include Kampung Sungai Kembang, Kampung Perigi Nenas, Pulau Indah's Customs Resident, Kampong Teluk Nipah, Bandar Armada Putra, Kampong Sungai Pinang, and Kampung Orang Asli Pulau Indah. Majority of the respondents (80%) seem not to be satisfied with existing mobile applications, and the users highly agree to develop a apps to be applied in searching relevant healthcare information and accessibility in this study area.

Practical Apps Elements and Functions

The interface was developed based on the user requirement using the MIT Inventors platform. There are three main layouts of the interface designed for these apps as shown in Figure 1. The first layout is the Home page. It contains three buttons which are Healthcare button, Healthcare Information and User Manual button. Each of the button in this page is the door to get through to another interface. The second interface is the main page. This page gives the users the option to choose their healthcare treatment. The government and private buttons are for the user's option to choose different types of healthcare facilities listed in the app.



CONCLUSIONS

This proposed system is beneficial to local communities, especially in semi-urban and rural areas in Malaysia such as at Pulau Indah, the communities faced several problems to reach the healthcare facilities. Besides lacking technology application among the communities, services limitation at available local healthcare centre, transportation problem and cost constraint are also causing the problem on the communities to get the appropriate health services. Thus, they need a practical information system for healthcare accessibility and information services. A geomobile healthcare apps has been developed in this innovation with some benefits and special features. This apps functions can help the residents to obtain information on the nearest healthcare services for treatment and supplementary information of health clinic. By using the information provided in this apps, it will make it easier for users to decide on a clinic closest to them that suit their needs.

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REFERENCES

- Shen, S. T. (2016). People and their smartphones - Mapping mobile interaction in the modern connected world. *Engineering Computation*, 0153.
- Viswanathan, P. (16 October 2017). What's a Mobile Apps? Retrieved from <http://www.lifewire.com/what-is-a-mobile-application-2373354>. 12/12/2018.

MyHIKING@GEOEXPLORER©: AN INNOVATIVE MOBILE APPLICATIONS FOR HIKING INFO EXPLORATION

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ABSTRACT

One of the most popular tourism activities is hiking. Hiking is an outdoor activity which consists of walking in a natural environment, and in mountainous or other scenic terrain. As hiker lovers or beginners, they found it is hard to find a complete web-based system and mobile application that locate the hiking location with the important geoinformation, specifically in Selangor. Besides this, the limited information in existing web-based systems and mobile applications are not much helpful for the beginner in order to start hiking in local exploration. Therefore, this innovation is aimed to develop a Hiking@Explorer©, which a web-based system and mobile application for hiking geoinformation and geoexploration in Selangor. Majority of the respondents agreed to develop a system with a completed information such as location, coordinate, fee and other significant geoinformation. The developed web-based system and mobile apps could allow user to find and analyse the required hiking location. Most of the respondents are also agree on the overall functions proposed in the system that meet their requirement. This innovative hiking Apps would help user to know the information on the location of hiking as to increase the number in tourism activities in Malaysia.

KEYWORDS: Hiking; GeoMobile Apps; GIS Web System; GeoTourism.

INTRODUCTION

Hiking is an outdoor activity that consist of walking for a longer period and basically over terrain where hiking boots are required. Many types of hiking applied by the hikers such as hike a day, long-distance trails, bushwacking or trail identification. Hike a day refers to a hike that can be completed in a single day and not requiring an overnight camp. Long-distance trails are the longer recreational right-of-way routes mainly through rural areas, used for non-motorized recreational travelling such as walking, backpacking, cycling or horse riding. Hiker's lover or the beginner found that it is hard to find websites that locate the hiking location along with the imperative information, specifically in Malaysia. The existing websites created from the oversea and locating the hiking spot from the other country. Furthermore, the information in the website is not much and helpful for the beginner in order to start hiking at the sites. Website is one of the multimedia mediums that became a common expression. In this innovation, website or web-based system was developed to display to the users about location of the hiking spot in Selangor. Users will easily get the information that they are required such as the location, the level of hardness of hiking, the types of hiking trails and other useful information in the system.

PRODUCT DEVELOPMENT AND UNIQUENESS OF MyHIKING@GEOEXPLORER

Generally, this innovation was created using several steps. Firstly, need assessment consist of three main parts, including initiation, data collection and analysis and final production. Secondly, data collection and analysis. Data collection was carried out by interviewing persons, researchers to give their surveys besides reviewing existing document or any related method. Lastly, the data analysis was determined to display the most significant hiking spots in Selangor.

User Requirement for Developing the Mobile Applications

Need assessment was conducted to obtain an information on the user feedback on the proposed system. Questionnaires were randomly distributed to respondent from various ages and gender and about 25 responses obtained as a returned. About 63.6% of respondents agreed that there are not really satisfied about the existing platform exist in the market they do not obtain the information that they really need such as difficulty and approximate hiking time. Therefore, the apps of MyHiking@GeoExplorer is an ideal system to be introduced.

Implementation and Testing of Web-Based System for Hiking Exploration in Selangor

This section showed the result of web-based system that has been developed for hiking exploration in Selangor. This web-based system has been tested to make sure the system is working properly and run smoothly as shown in Figure 1. Both web-based system and mobile application were tested together to make sure they run smoothly and practically. 10 respondents were chosen randomly and answer several questions in order to give feedback about the performance. About 62% of the respondents agreed that they really understand well on how to use the application.

CONCLUSIONS

This web-based system and mobile application were built to help hikers or beginners to get an information on the hiking exploration in Malaysia, specifically in Selangor. Generally, the two platforms were developed based on the user requirement that has been conducted earlier in the first stage of the study. Majority the respondents stated that the existing web-based system and mobile application do not meet their requirement as they do not have detail geoinformation about the hiking spots. Therefore, the respondents think it is necessary to develop websites or mobile applications that show the information of hiking exploration in Selangor. The respondents were also given several suggested information that should be display in the websites or mobile application, and they suggested the proposed system need have map, location, difficulty, fee, approximate hiking time and coordinate of the location. Majority of the respondents were agreed to display all this additional information in the proposed web-based system and mobile application.

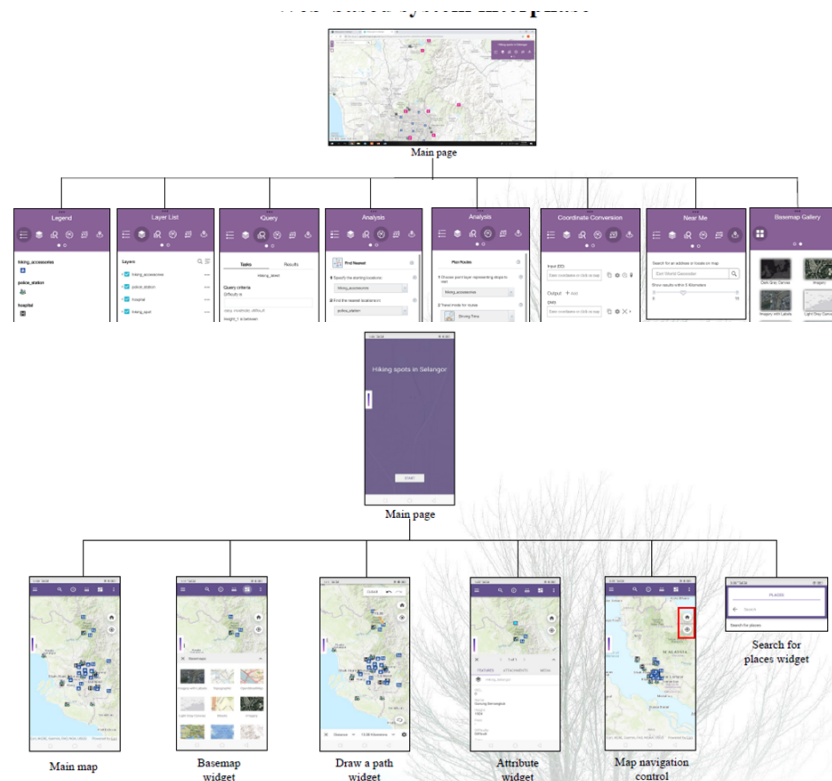


Figure 1: Menus and Functions in MyHiking@GeoExplore©

ACKNOWLEDGMENT

The authors would like to thank to Faculty of Architecture, Planning and Surveying, Universiti Teknologi MARA (UiTM), Selangor, Malaysia for supporting this study.

REFERENCES

- Hill E., Cortland S, and Goldenberg M. (2009). Benefits of Hiking: A Means-end approach on The Appalachian Trail.
- Stopper R., Sieber R, and Schnabel O. (2012). Introduction to Multimedia Cartography.

GEO-MOSQUE-VISUALISATION©: VISUALISING MOSQUES GEOINFORMATION IN KUALA LUMPUR

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ABSTRACT

Mosque represents the heart of Muslim religion and community. Mosque plays important roles in bringing the Muslim communities together. Functions of the mosque are also getting wider in parallel with the technological changes. A proposed GeoMosqueVisualisation© in Kuala Lumpur does not only act as the place for religious purposes, but the beautiful and the modern architecture has turn it into knowledge and tourism attraction in Malaysia. The country also needs a complete system for recording, providing and exposing geoinformation about the mosques. Therefore, the aim of this invention is to build a geoweb system and geomobile application for mosque exploration and visualisation in Kuala Lumpur. After conducting user requirement, majority the respondents agreed that the system and applications of discovering mosques in Kuala Lumpur need to be successfully developed. The prototype built has more geoinformation on the mosques such as the location that can help user to get the systematic direction of the mosque and the geo-activities of the mosque. The respondents also agreed with the overall functions proposed in the system with some constructive further improvement.

KEYWORDS: GeoMosquesVisualisation; GeoWeb-Based System; Mobile Applications;
GIS; Geospatial Virtual Reality.

INTRODUCTION

Since the beginning of Islam, the institution of mosque has been playing the main role in establishing, developing and flourishing the Muslim communities. The word of mosque is originated from the word “Mesjid”. It is the sacred place where people go there to prostrate god. In terms of community, it is the place where the Muslims meet at least five times a day to worship the one God. Mosque represents the heart of Muslim religion and community. Even in the past years, mosque had become one of the biggest institutions in Islamic world. Some of the functions of mosque in the past including as a learning school, a court, and a political forum where citizens discussed their problems with the khalifa (Rabah Saoud, 2002). It shows that the mosque is playing an important role in bringing the Muslim communities together.

As the technology is developing, the function of the mosque is also getting wider. The mosque does not only act as the place for the religious purposes, but the beautiful and the modern architecture has turn it into one of the tourism attractions in Malaysia. Being the capital city of Malaysia, Kuala Lumpur has become one of the famous tourism spots among the foreigners and even the local from other state. Having majority of Muslims community, mosque is one of the dominant Islamic landmarks in Kuala Lumpur. Despite the importance of the role of mosque in Malaysia, the recording, providing and exposing information about the mosques are still lacking. Most of the information provided regarding to the mosque are mostly done in a hardcopy way which make it less easy and less interesting for the information to be deliver to the user. Thus, the role of technology is needed in providing the information of the mosque in an easier, faster and practical way.

Today, the maps are available in digital form such as on computer and mobile phones. Technologies advances nowadays are changing the way maps are created and displayed such as digital and web-based multimedia cartography that are bringing maps outside the mainstream flow by giving a new life to archive data such as old paper maps and photographs (Dieudonne Muofo and Anita Muller, 2009). There are also several websites

showing some information about the mosques. Each of the website has different focus, but all the websites are still lacking the detail information about the mosque that could be beneficial for both of the Muslims and tourists. Therefore, this innovation is intended to build a apps and website of multimedia cartography consisting of the map of mosque in Kuala Lumpur completed with other geo-spatial information.

PRODUCT DEVELOPMENT AND UNIQUENESS OF GEO-MOSQUE-VISUALISATION©

The methodology used encompasses paradigm, theoretical model, phases and quantitative or qualitative techniques using ArcMap, ArcGIS online and AppStudio for ArcGIS online. The aim of this product is to build a web system and mobile application for enhancing the information through platform of mapping for mosques in Kuala Lumpur and analyse the result.

Positive Feedbacks from the User

There are 27 respondents from variety of ages and sexes who gave their responses on this product's survey. It is found that most respondents were unsatisfied with the existing system and application on the market. This may be caused by the lack of information provided in the existing system or application on the internet. Therefore, the respondents were suggested on the information that they prefer in the system for exploring the mosques in Kuala Lumpur. The information include address, activities, facilities, and map location of those mosques,

Hands-on Functions of the Web System and Mobile Applications

This web-based system was developed so that the public can easily access the information of mosques in Kuala Lumpur such as the location, types and activities of several main mosques in Kuala Lumpur as shown in Figure 1. This website allows the users to get know the activities available for the mosque which will then help them in decision making.

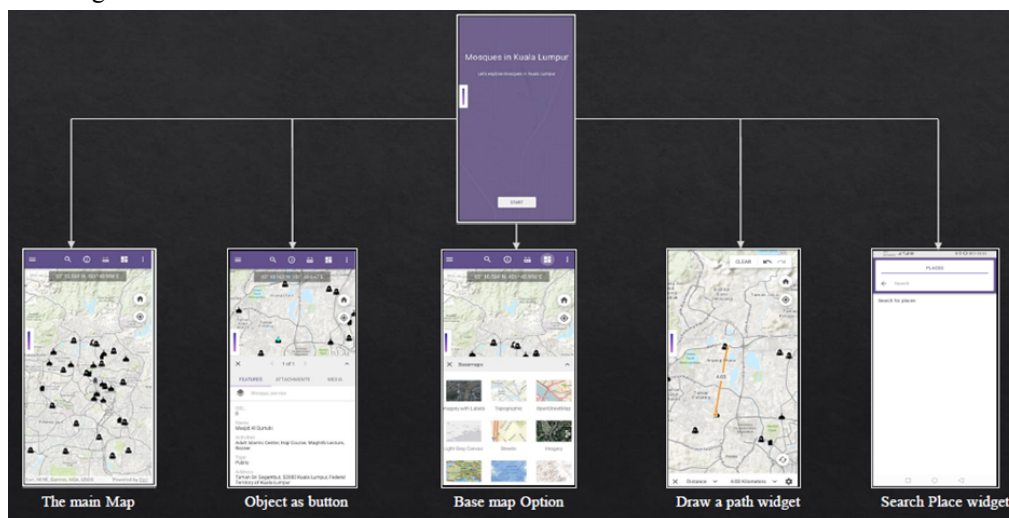


Figure 1: Menus and Functions in Geo-Mosque-Visualisation©

Reliable Web-Based System and Mobile Application

Both application of the system was tested together in order to ensure the functionality of the system. Based on the test, 80% of the 10 respondents were satisfied with the proposed system. While another 20 % percent were natural and average with the function proposed in the system.

CONCLUSIONS

The web-based system was developed aiming at geovisualising the exploration of mosques in Kuala Lumpur. The respondents agree that it is necessary to develop a web-based system or mobile application for helping the public to get detailed information or discoveries about the mosques. The information include address, activities, facilities and map location of those mosques. Since the respondents also strongly agree to depict all the suggested information inside the system and mobile application, this proposed product is reliable and practical to be applied by local users at the sites.

ACKNOWLEDGMENT

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REFERENCES

- Dieudonne M and Anita M. (2009). Web-Based multimedia cartography applied to the historical evolution of Iqaluit, Nunavut. Retrieved from <https://www.isprs.org/proceedings/XXXIV/part4/pdfpapers/501.pdf>, 15/7/19.
- Rabah S (2002). A review on Mosque Architecture. Retrieved from <https://muslimheritage.com/uploads/the-mosque-275.pdf>, 15/7/19

DIGITAL PROCESSING MODELING OF ROAD ACCIDENT PATTERN USING INTEGRATED GIS APPLICATION

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ABSTRACT

Researchers in Malaysia are increasingly focusing on the tools used for analyzing road accidents due to the urgent need to manage and evaluate the abundance of accident data available. Of these tools, Geographic Information System (GIS) has the advanced ability to perform complex spatial analysis. In light of that, this study seeks to determine the capabilities of GIS in analyzing of road accident pattern. This objective is achieved by carrying out spatial temporal analysis, hotspot analysis, spatial autocorrelation, and ordinary least square (OLS) analysis. The 44,767 accident cases registered in Kedah over a period of 3 years (2013-2015) is used as a benchmark for analyzing accident pattern. This study takes into account road characteristic and environmental factors. Results of this research show that GIS has the ability to perform an effective spatial analysis, thus allowing for pattern identification which in turn provides a greater understanding of travel behavior and facilitate accident analysis. GIS is able to reveal patterns and trends that may not be recognized in a tabular or written visualization of the same data; this helps to improve the decision making process. With a good understanding of these tools analysts would be able to make better decisions about road accident pattern in the future.

KEYWORDS: Geographical Information System; Information Management; Road
Accident; Spatial Analysis.

INTRODUCTION

Road accidents are one of the biggest problems faced by the world, as evidenced by the large number of report on loss of lives and properties experienced by many countries. Malaysia has recorded an increase in the number of road accidents, i.e. from 533,875 cases in 2017 to 548,598 cases in 2018 (Zubaidah Ibrahim, 2019). Currently, accident data in Malaysia is recorded by the police in a standard form and the record is then transferred to Malaysian Institute of Road Safety Research (MIROS) for digitization and development of accident database (Ahmed et al., 2014; Oxley et al., 2013). However, there is a lack of consistency in the format of crash data and storage between divisions or departments (Paz et al., 2015). Hence the data are documented in different formats and the accessibility regime is different for each organization. The method of storage is mainly in analogue publications, which means that retrieval of the data is cumbersome and, at worst, it is no longer accessible when the data is lost. There is an urgent need to manage and evaluate the large amount of accident data. This requires the creation of a new database system to resolve this issue and to synchronize the data.

Geographical Information System (GIS) can be utilized to overcome this problem and to improve the efficiency and effectiveness of road accident analysis. GIS is a system for capturing, storing, checking, integrating, manipulating, analyzing and displaying data that has been spatially referenced to the Earth. GIS is also utilized to make the analysis less time consuming and less tedious, which otherwise would have been be very labor-intensive with the immense amount of accident data (Nayak, 2014). This application is becoming increasing popular among

decision makers as it enables them to make a quick reference to the GIS outputs and make the right decisions when dealing with problems. In this regard, GIS application offers a platform for maintaining and updating accident database, which could then be used for further analysis. Hence, this study aims to incorporate the use of advanced spatial statistical methods with GIS to evaluate an innovative approach for road accident pattern analysis.

DIGITAL PROCESSING DEVELOPMENT

The road accident database was developed using ArcGIS 10.5 software. This study was carried out in three stages, as illustrated in Figure 1. The data collection phase includes gathering of the data for road accident, road, traffic volume, slope, temperature, rainfall and wind speed. In the data processing phase, all gathered data were processed by defining coordinate projection of data editing, cleaning and removing incomplete data, key-in the data attributes such as wind speed, volume of rainfall and temperature value and lastly calculated traffic volume. After that, determination of accident factor was classified into two categories namely; road characteristics (type of lane, level of services (LOS) and slope) and environmental factors (temperature, rainfall and wind speed). The analysis phase was carried out by performing four analyses namely; hotspot analysis, spatial temporal analysis, spatial autocorrelation analysis, and ordinary least square (OLS) analysis to establish the pattern of road accident.

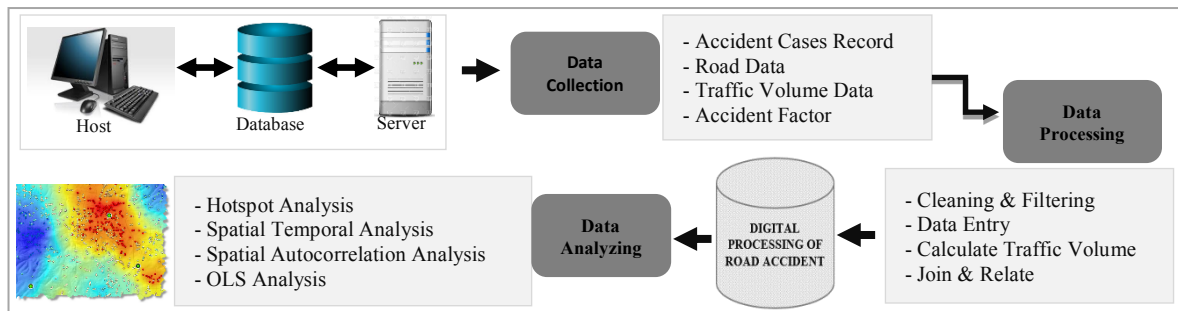


Figure 1. Framework of Digital Processing

FINDINGS

This section discusses the digital processing of accident data. The development of digital processing takes into consideration i) the integration of data from multiple sources, and ii) minimizing costs and time by creating a database system and analyzing the data using advanced spatial statistical methods in the GIS application. Results show that for a spatial temporal pattern of accident cases, most of road accidents occur in the evening and the highest number of accidents is recorded on Thursday. There are two accident hotspots in Kedah, namely; Alor Setar and Sungai Petani, where the pattern of accidents occurred in clusters, as shown in Figure 2.

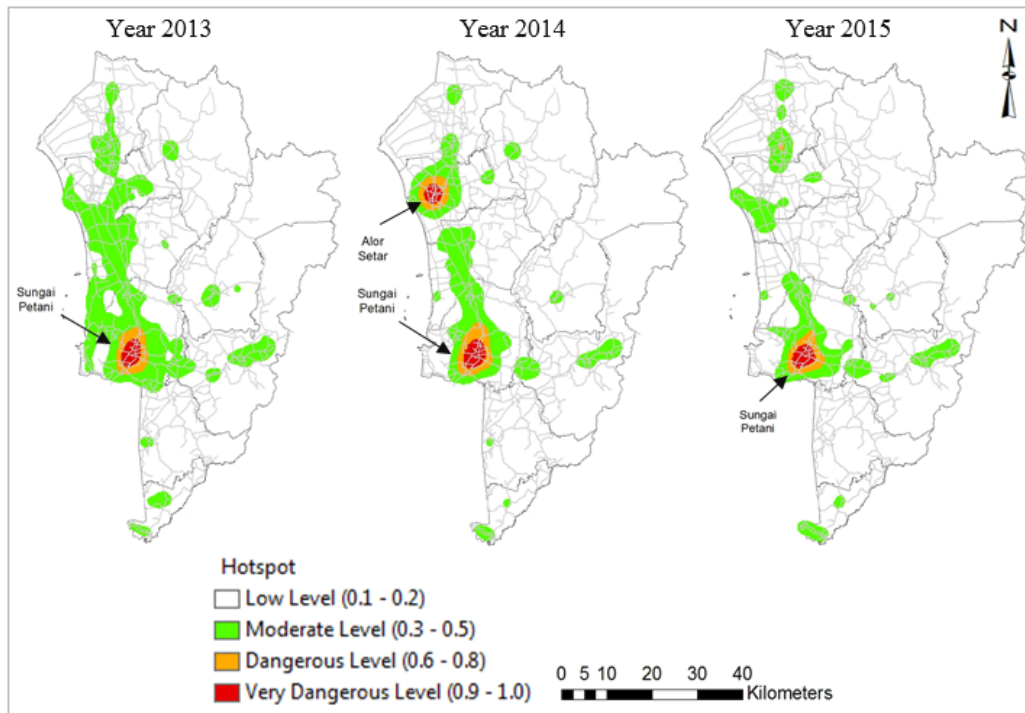


Figure 2. Hotspot Area in Kedah for Year 2013 – 2015

Finally, the outcome of the OLS method shows that, of the six parameters of road characteristics and environmental factors, LOS (23%) is the primary factor contributing to road accidents for the period from 2013 to 2015, followed by lane type (19%), temperature (16%), rainfall (15%), wind (14%) and slope (13%), as shown in Figure 3.

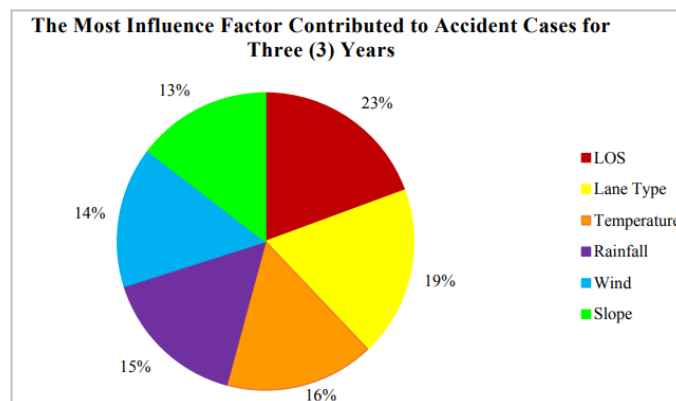


Figure 3. The Most Influence Factor for Three (3) Years

In summary, GIS application was used to analyze, stores, manipulates and visualizes geographic information, usually in mapping, which has proven as a digital processing through computer-based tool to investigate the pattern of road accident. Together with its advancement, GIS can solve spatial analysis with ease due to efficiency of record-keeping without redundancy of data.

CONCLUSIONS

In summary, GIS application has the capability to analyze road accident patterns. The result of this analysis can be used by the police department or other authorities to improve the safety of the community. In the future, accident reporting system can be developed as a working database and feedback mechanism of road traffic accident data, which in turn would facilitate the modeling of accident occurrence with a view through real phenomena occurrence of accident cases. Just as importantly, real time road accident processing systems can be built using the latest technological advancements.

ACKNOWLEDGMENT

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REFERENCES

- Ahmed, A., Sadullah, A. F. M., &Yahya, A. S. (2014). Accident Analysis Using Count Data for Unsignalized Intersections in Malaysia. *Procedia Engineering*, 77.
- Nayak, S. C. (2014). Accident Analysis and Development of Crash Prediction Model for a Mid-Sized City.
- Oxley, J., Ravi, M. D., Yuen, J., & Hashim, H. H. (2013). Fatal Motorcycle Collisions in Malaysia , 2007-2011. 16th Road Safety on Four Continents Conference, (May), 1–12.
- Paz, A., Veeramisti, N., Khanal, I., Baker, J., & De La Fuente-Mella, H. (2015). Development of a Comprehensive Database System.
- Zubaidah Ibrahim. (2019, 01 June). Hampir setiap minit berlaku kemalangan. Kosmo Online. Retrieved by <http://www.kosmo.com.my>.

AL-QIBLAT APPS©: A GEOMOBILE APPS FOR ACCURATE AND LOCALISED QIBLAT DIRECTION IN MALAYSIA

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ABSTRACT

Every day, more than a billion of Muslims in the world face the Ka'bah in Mecca five times as they perform their daily prayers. The direction towards the sacred Ka'bah is called qiblat. Previously, people used conventional methods such as stick when travelling around the world in order to see the shadow to determine the prayer times and qiblat direction. Nowadays, various mobile and web applications exist to accomplish the similar tasks. However, such applications require huge location database and human intervention to calculate current location, and it is therefore it needs mental effort or reduces users' learnability. Besides, most the apps are developed by non-localised and non-geomatic-background, leading to the miss-conducting the programming of the apps. AL-Qiblat Apps© as an Islamic innovation is developed with has uniqueness in terms of accuracy and localisation aspects compared to existing apps. This innovative apps offers geomatic elements to calculate true bearing of qiblat to determine the qiblat direction accurately according to real site usability and reliability. This latest advancement of human computer interaction technology and context-aware computing environment has demonstrated the improvement of the mental model design in mobile qiblat applications.

KEYWORDS: Qiblat Direction; Geomatics; Mobile Apps; Ka'bah; AL-Qiblat.

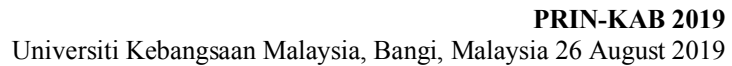
INTRODUCTION

Prayer is one of the central elements of Islamic practice and worship. Indeed, it is the second of the Five Pillars of Islam and along with the testimony of faith, fasting the month of Ramadan, paying the poor tax and the pilgrimage to Mecca, forms the essential framework of religious life for Muslims. The cube is the qiblat the direction Muslims face during their prayers. It is important to note that though Muslims face the Ka'bah during prayers, they do not worship the Ka'bah. Muslims worship and bow to none but Allah. It is also mentioned in AL-Quran: We see the turning of thy face (for guidance) to the heavens: now shall we turn thee to a Qiblat that shall please thee. (Al-Baqarah: 144)

The Qiblat direction is important while performing solat and plays a part in various ceremonies. Hence, finding the qiblat accuracy for Muslims to face the correct direction to fulfil their worship of Allah is an important aspect in legislation and it is a legal requirement between either pray the obligatory prayers and circumcision prayers.

Before modern era technology arrived, there are few conventional methods of finding the direction of qiblat especially for those who are far away from Mecca. Sun and stars are used as a base guideline and during these days, the Muslims that live far away from Makkah just face to any direction with confidence due no scientific way to locate qiblat direction accurately. However, it is very important for people to be aware that this technique does not give 100% of accuracy since in Malaysia, the degree for qiblat falls from 290 degree to 293 degree, but the sunset degree throughout the year falls from 235 degree to 295 degree.

In a modern era of technology, qiblat determination methods has evolved into much more simpler way to use and do not need complicated computation or calculation due to invention of devices and applications such as qiblat compass, mobile phone applications that can automatically detect the direction of qiblat wherever you are as well as non-mobile web-based applications. The most chosen one is mobile application because it is easy to use especially when travelling and when there is no access to mosque, but the reliability of the applications were doubted.



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Reliable and Practical Application

The goemobile application has been evaluated in terms of performance, capabilities and accuracy to make sure the application can be market to the play store. This geomobile had been also compared to the exiting qiblat applications to test the benefit and drawback this proposed application, including Pro Muslim, SalamWeb, and Qibla Compass: A Minimal Qibla Direction Locator. The result is interesting when the location info of the proposed apps is more accurate and localised input than other existing apps. In addition, the accuracy of the application has been tested from the observation of four different states and pending accredited by JAKIM for determining the direction of the qiblat.

CONCLUSIONS

As a Muslim, the direction of the qiblat to perform the prayers is very important to perfection of the second pillar of Islam. Although there have conventional methods to determine the qibla direction and lots of applications have been made by individuals or agencies, each apps created maybe not being tested before it released, and then it is causing the application to be diverted far from the direction of the true qiblat as done by this innovative product. Since. qiblat direction is very important to determine whether our prayers are valid or not, users need to choose the right application and believe that application the apps chosen can give the right direction to the qiblat of Ka'bah.

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REFERENCES

AR Qibla Finder (2012). AR Qibla Finder - Android Apps on Google Play. [Mobile Application] Retrieved from <https://play.google.com/store/apps/details?id=AR.Qibla.Finder&hl=ms>. 12/12/2018
Abdali, S.K. (2009) The Correct Qibla. Retrieved from <http://www.patriot.net/users/abdali/ftp/qibla.pdf>. 09 September 2018.

QS SMART LEARNING KIT

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ABSTRACT

Purpose – the innovation’s purpose is to assist the teaching and learning process in doing quantities measurement of building works and identify the effectiveness of using the QS smart learning kit.

Design/methodology/approach – the innovation includes review literature on teaching and learning technology in general and outcomes of questionnaires.

Findings – The innovation highlights the main findings of the result of the questionnaire. The research recognised problems faced by some students who find it difficult to understand the construction of building elements learned in the classroom. Students need a visit to the site to see for themselves the technology and construction of a building. This innovative product can address the problem of students lack knowledge about building structures to make quantities measurement to get an initial idea of the layout and shape of the building elements. Through the use of QS Smart Learning Kit, this method of learning will be more organised and easy to understand for all students taking Building Work Measurement courses. Also, this innovation saves time and cost.

Originality/value – This innovation explores the using of technology in teaching and learning method compared to conventional ways. Instead of two-dimensional drawing, more interactive and three-dimensional details, drawing can be achieved through this learning kit.

KEYWORDS: QS smart learning kit; Quantity surveying; Teaching and learning; Technology

INTRODUCTION

The teaching and learning process will be most effective with teaching aids (ABBM) that can convey information on topics that taught more clearly and systematically (Charlie, 2008; So & Bosung, 2009; Loveless, 2003; Mayer, 2001). Teaching aids divided into two categories: electronic (electronic) and non-electronic (print media). Examples of electronic ABBMs are radio, television, video, projector slides and computer aids. Non-electronic categories, for example, are scanning cards, journals, magazines, models and photos related to teaching topics (Fadzli, 2010; Rusmini 2002; Salbiah, 2008).

Kit learning is an innovative way as a teaching tool in polytechnics to make teaching and learning more accessible for students to understand. The advantage of this learning kit is to provide interest and appeal to students and to encourage students to engage in the classroom. As such, it can enhance students' understanding and teaching and learning process.

The QS Smart Learning Kit or Quantity Surveying Smart Learning Kit is one of the most straightforward learning tools to facilitate Diploma in Quantity Surveying in learning using the three dimensional (3D) method. This method of learning is most effective in getting to know every element of a building in detail without having to look directly at a project. Students can visualise the building of elements and understand the structure or parts of them.

The exposure of this innovative study based on the problems that some students often find difficult to understand in the classroom. Usually, the Diploma of Quantity Surveying students is less familiar with the construction of building elements. Students need a visit to the site to see for themselves the technology and construction of a building. However, students need to have a green card first before entering the site construction. The product of this innovation study can address the problem of students with less knowledge of the structure of the building to make quantitative measurements to get a better idea of the layout and appearance of the elements

of the building. Thus the production of a product called the QS Smart Learning Kit can help students to understand better and quickly apply what they have learned in class.

The objective is to assist the teaching and learning process more efficiently and effectively in the classroom and to identify the effectiveness of using the QS Smart Learning Kit.

The QS Smart Learning Kit can significantly benefit students or users. It saves time and cost. This method of learning will be more organised and easy to understand for all students taking Quantity Surveying or Civil Engineering courses. Learning sessions will also be more productive and interactive. This learning kit focuses more on communication and information technology today instead of using materials such as book references or site visits. All the elements and structures of each building can be found more easily by simply opening one communication device such as a computer or laptop.

METHODOLOGY

This QS Smart Learning Kit uses Sketchup software. The development of this learning kit based on the Building Works Measurement syllabus, which involves quantifying according to the elements in the construction of a building. The elements involved are substructure and superstructure, which are elements such as work below lowest floor finish, frame, staircase, door, window and roof. In this study, questionnaires were used to identify the effectiveness of the QS Smart Learning Kit. Using a questionnaire is a way to get much information at a minimal cost. The suggested answers make it easier for respondents to answer quickly.

FINDINGS AND DISCUSSION

Questionnaire findings

Table 1 shows the analysis of the result of the effectiveness of this innovative product as a percentage. Most of the respondents agreed and with the statements in the questionnaire.

Table 1. Questionnaire analysis

No.	Item	Disagree		Agree	
		n	%	n	%
1	The kit saves the cost of having to buy a reference book.	19	8	215	92
2	The kit is easy to reference.	7	3	227	97
3	The kit is perfect for learning.			234	100
4	The kit saves time in learning.			234	100
5	The kit is more comfortable to carry safely.	2	1	232	99
6	The kit does not charge for installation.			234	100
7	The kit is user-friendly for learning.	44	19	190	81
8	The kit is not limited only to students but lecturers as well.			234	100
9	The kit contributes to blended learning methods.	26	11	208	89
10	The kit is convenient and useful for students in the learning process.			234	100

The use of this Smart Learning Kit was developed not only for student use but also for use by lecturers for the teaching and learning process and anyone involved in the construction industry. This innovation is related to learning methods that use a more effective, easy-to-understand and orderly way of identifying student problems to understand structures in buildings that are not visible to the naked eye. This product also provides convenience to the students in learning. Among the added value of this product is the use of more efficient software to make measurements, and it is more time-consuming and cost-effective.

CONCLUSION

This product developed after discovering a common problem for students in learning that is to recognise the concept and function of each building element in the drawing. This QS Smart Learning Kit provides proven effectiveness through the achievement of the Diploma in Quantity Surveying in the final examination of the Building Works Measurement and Construction Technology course. Students will be able to recognise and visualise each element of the building to make quantitative measurements. Also, this research product has a high degree of marketability and is marketable and demonstrates creativity in the delivery of teaching. For the future, the product upgrades with other drawings such as building services or external works of the building.

REFERENCES

- Charlie Anak Unggang. 2008. Penggunaan bahan bantu mengajar dalam kemahiran asas membaca di kelas pemulihan: kajian kes di lima buah sekolah Daerah Serian. Jurnal Penyelidikan IPBL, Jilid 8. Retrieved from <http://www.ipbl.edu.my/portal/penyelidikan/jurnalpapers/jurnal2008/charliejn2008.pdf>
- Fadzli Dahalan. 2010. Tahap penggunaan bahan bantu mengajar (BBM) di kalangan guru-guru ketua panitia kemahiran hidup di Sekolah Rendah Daerah Kulim Bandar Baharu.
- Loveless. 2003. The interaction between primary teachers' perceptions of ICT and their pedagogy. *Education and Information Technologies* 8:4, 313 – 326.
- Mayer, R. E. 2001. Multimedia learning. New York: Cambridge University Press. ISBN 0-52178-749-1.
- Rusmini Ku Ahmad. 2002. Integrasi teknologi maklumat dan komunikasi dalam pengajaran dan pembelajaran.
- Salbiah Ismail. 2008. *ICT in teaching and learning in Malaysia: the Malaysian smart schools*. Putrajaya: Unpublished Educational Technology Division, Ministry of Education, Malaysia.
- So, H. & B. Kim, B. 2009. Learning about problem based learning: Student teachers integrating technology, pedagogy and content knowledge. *Australasian Journal of Educational Technology*, 25(1), pp. 101–116.

WREXLAER: WATER ROCKET LAUNCHER FOR EXPERIENTIAL LEARNING IN AEROSPACE ENGINEERING

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ABSTRACT

Water rocket is a model launch vehicle that uses water as its propellant. Operating on the Newton's principles of motion, the water inside the rocket is forced out by pressurized air, capable of launching it tens of feet up in the air. Experimenting with water rockets is one of way of introducing hands-on education of aerospace engineering and rocket science at school level. While creating the water rocket itself is simple, making a safe and proper launcher has been a challenge for teachers. A do-it-yourself launcher may lack in safety and accuracy, whereas the equivalent online products are usually overpriced and not compatible with the size of local soda bottles. The lack of innovation in water rocketeering competitions in Malaysia also indicates the needs of some kind of design improvement and improvement. We design a complete, assemble-and-play kit for a universal water rocket launcher that can be quickly assembled under 10 minutes. The design process was carried out with safety and design for assembly in mind. The kit comes with assembly instructions, teacher's guide for activities, and suggestions on pedagogy. The aim of this innovation is to provide schools – both teachers and students – the most accessible way to introduce aerospace science and engineering while promoting a safe environment for experimentation.

KEYWORDS: Engineering education; Aerospace engineering; Experiential learning; Design for assembly; Water rocket launcher.

“IT’S NOT ROCKET SCIENCE!”

The phrase often gives the idea that rocketry – or its broader term aerospace engineering – is a complicated subject of which only ‘experts’ are capable of doing it. Education on the subject matter is often only confined to learning physics concepts and solving related mathematical problems in class. Student interest in engineering education is critical — students must be able to design their creation and experience the actual consequences of their own engineering analysis and design. However, the idea of experiential learning – the process of learning through the experience of doing – can be dreadful to some teachers. This understandable due to the difficulty of designing a safe and manageable activities for students to go on their engineering adventure. Time, for lecturers and teachers, are indeed of the essence. Experiments and activities, hence, are often simplified and mundane, and this work is aimed to change this by removing some of the challenges through clever innovations.

Flying water rocket, if done correctly, has the potential to be an adventurous but safe and inexpensive way for students to learn the basics of aerospace flight. Just like their model rocket cousins, water rocket launches are powered by a combo of water and high-pressure instead of a chemical combustion. The following STEM concepts can be introduced through this water rocketeering activities: aerodynamics, propulsion, projectile motion, engineering design, and optimization. Water rocket competition is a common international activity. The Water Rocket Achievement World Record Association organizes competitions for altitude records. The highest altitude gained by a water rocket is recorded by the students of the University of Cape Town, reaching an altitude of 830 meters in 2015.

PRODUCT DEVELOPMENT

The water rocket system consists of two main subsystems: the rocket and the launcher. The rocket itself is usually just a common plastic soda bottle filled with liquid (water). The launcher, the more complex subsystem, must be capable of providing high-pressure to launch the rocket.

Figure 1 shows the initial sketch of the idea for the water rocket launcher design. The idea is realized into a water rocket launcher assemble-and-play kit shown in its disassembled form and assembled form in Figure 2. Table 1 lists the individual components included in the kit.

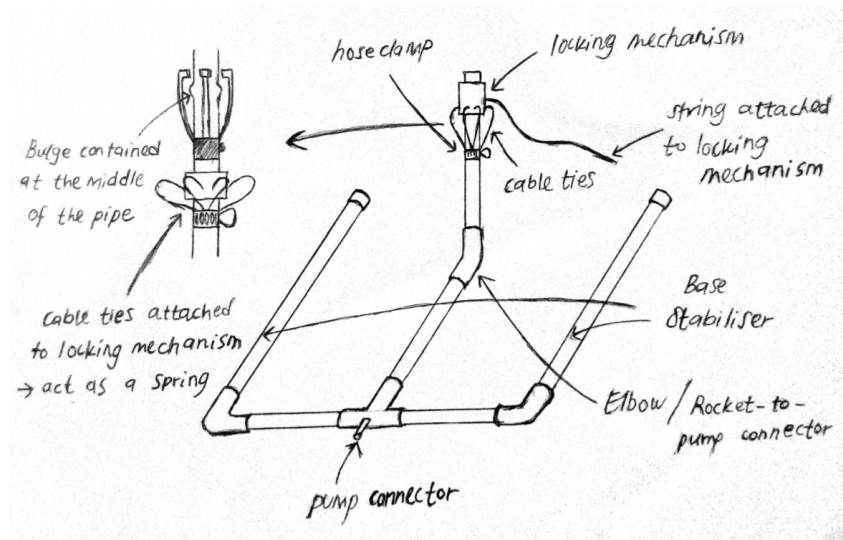


Figure 1. Conceptual ideas presented in a design sketch

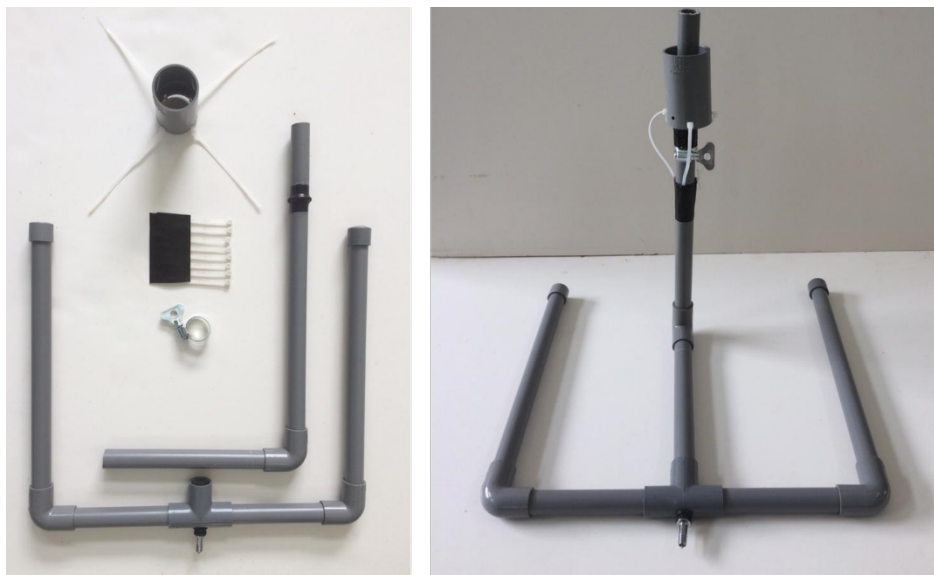


Figure 2. Individual components of the water rocket launcher (left) and the fully-assembled launcher (right)

Table 1. List of materials included in the water rocket launcher kit

Materials	Quantity
3/4" PVC pipe (15 mm diameter)	3
PVC T Connector (15 mm)	1

PVC 90° elbow (15 mm)	3
PVC cap (15 mm)	2
Cable ties	10 ~ 12
Hose clamp	2
PVC sleeve (32 mm)	1

CONCLUSIONS

Creating and testing water rockets addresses higher order of thinking, develops making skills, and teaches the rigors of engineering. This innovation solves the problem of creating a safe and quick-to-assemble water rocket launcher to provide lecturers and teachers a ready-to-go experimental kit for an experiential learning in aerospace engineering and rocketry. In a way, the innovation presented here skips the *leceh* (troublesome) part of water rocketeering and lets educators focus more on facilitating a seriously fun learning environment.

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EFFECTIVENESS OF EDU-MARtrix TO ENHANCE STUDENTS' SELF LEARNING

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Keywords: MARTRIC, technology

ABSTRACT

EDU-MARtrix is a revolutionary mobile app that aims to tackle multiple problems namely self-learning issues associated with vague information, overconsumption of papers, time-consuming endeavours and orthodox methods which indefinitely bore the millennial generation. EDU-MARtrix enables both SCIENCE and Accounts Foundation students to effortlessly retrieve information at their fingertips. In the absence of a centralised management where inconsistencies in relaying information may occur, EDU-MARtrix offers structure and is hence systematic as the arrangements created are set to follow the desired learning stages as stipulated by the syllabus. For Science Foundation students, EDU-MARtrix is developed with a built-in files management system which allows respective teachers to publish documents, videos, pictures and hyperlinks at students' disposal. For Accounts Foundation students, EDU-MARtrix is embedded with Ze Wheel TVM Kit - a gamification using Power Point and interactive notes which consists of keywords, examples, formula and various methods of calculation to solve TVM problems specifically designed for students undertaking Business Studies. A survey shows an average of 96.4% of 100 students from Johor Matriculation College gave positive feedbacks in accessing information regarding their lessons. Similarly, 80% JMC lecturers concurred that EDU-MARtrix boosted their teaching process. With the statistical data supporting its overall impact, and by simultaneously having the capacity to mete out problems, EDU-MARtrix has a huge potential in leading innovation in education.

INTRODUCTION

Self-efficacy Teaching and Learning (T&L) process is fundamental in providing students with adequate basic knowledge in a particular subject. Self-efficacy among students is important in regards to their ability to perform tasks and activities (Bandura, 1986). It is also noted that the best way for students to learn is when they are able to discover things for themselves while taking advantage of new technology (Blumenfeld et al., 1991; Clinchy, 1989; Linn, et al., 2000; Lebow, & Wager, 1994).

New technology such as the mobile learning technologies are providing new techniques for educators to spread new knowledge while at the same time increase students' motivation (Derting & Cox, 2008; Mitra, 2007; Siozos et al., 2009). Given the complexity of the learning process as well as the time-consuming endeavour to ensure students' comprehension, one strategy to solve this problem must urgently be found. By encouraging self-efficacy among students with the help of a digital platform, educators are equipping students with one of the best learning experiences they can offer.

EDU-MARtrix is a method that allows educators to upload contents and information on an online drive, and permits students to access them using a simple bar code that they can scan using their own smartphone. This paper will analyse the performance of students and lecturers in using EDU-MARtrix based on their Teaching and Learning experience.

METHODOLOGY

Samples; two cohorts of students were involved in this study. Cohort one comprised 450 students in academic Session 2018/2019. While Cohort two consisted of 450 students in Session 2019/2020. EDU-MARtrix was implemented only for the latter cohort of foundation students.

Design & Development; For Cohort 1, EDU-MARtrix used diagnostic test worksheet and conventional worksheet. For cohort 2, EDU-MARtrix utilised online web-based to gain the data from the implementation of EDU-MARtrix.

Implementation;

Instrument; the study was carried out using mixed-methods, namely observation and questionnaire. In the first method, students who had not been taught about a topic were observed. They were instructed to complete a worksheet by accessing the information and content available in EDU-MARtrix. As for lecturers, they were asked on the frequency of using EDU-MARtrix in maximizing their delivery of course content. Subsequently, in the second method, a survey was conducted to test students' frequency of utilizing EDU-MARtrix (an analysis was carried out using t-test to compare the efficient use of EDU-MARtrix and college portal). Similarly, a survey was performed on lecturers to find to what extent EDU-MARtrix aids them in disseminating the whole complete contents of the course.

Respondent: A diagnostic test was conducted on 2018/2019 Session students and the results were collected. In 2019/2020 students were given an online worksheet and were instructed to use EDU-MARtrix tools to access contents in Google Drive. The worksheet results were obtained.

Data Collection Procedure: Data collection was conducted for two consecutive years. EDU-MARtrix was implemented as an alternative learning tool to support the face-to-face learning conducted by the lecturers.

RESULT AND DISCUSSION

Table 1 indicates the two samples used in this study showing number of students in two different sessions. Cohort 1 samples were taken from a diagnostic test from the 2019/2020 Session while the second cohort is from 2018/2019 Session. Cohort 1 was the latest session, and the samples were asked to complete the test with EDU-MARtrix while Cohort 2 completed the test without EDU-MARtrix. Interestingly, 74.45% of students in Cohort 1 passed the test (grade C and above) compared to only 9.33% in Cohort 2. This shows how highly effective EDU-MARtrix is in providing information to help them complete problems posed by lecturers.

Table 1: Percentage of students in each grade

Grade	Cohort 1 (%)	Cohort 2 (%)
A	15.56	0
A -	10.67	0
B	6.22	2.44
	14.67	1.78
B +	10.67	0
C	10.88	3.78
C -	7.11	6.89
C +	5.78	1.33
D	2.89	22.89
D +	9.11	2.67
F	6.44	58.22

Figure 1 shows the comparison of grade distribution among cohorts 1 and 2. It is obvious from the chart that students in Cohort 1, with the help of EDU-MARtrix were able to score better distribution at the top grades compared to Cohort 2. The chart clearly shows the frequency of students in Cohort 1 was more distributed among the better grades compared to Cohort 2. In fact, nobody in Cohort 2 was able to score the two highest grades from their test. This chart proves just how much students benefited from EDU-MARtrix. One random sample without EDU-MARtrix revealed no students achieved the top two grades, while another sample with EDU-MARtrix found as many as 118 out of 450 students managed to attain the two top grades.

Figure 1: Distribution of students in each grade

CONCLUSION

EDU-MARtrix is a system that allows students to access information regarding their course and syllabus efficiently. The technology is fast, mobile and easily reachable. The data supports this, as students in Cohort 1 who had access to EDU-MARtrix scored an overwhelmingly better results in the diagnostic test compared to the students in Cohort 2, who unlike Cohort 1, had no access to the system.

Since there is no centralized management system present in the college, inconsistencies and inadequacies in imparting information to students may occur. The embedded/inbuilt AR system in EDU-MARtrix offers excellent structure as the system is set to follow the desired learning stages as prescribed in the syllabus. Not only does this feature make the system more systematic, it conveniently provides students with the much-needed interactive materials which in turn makes learning very interesting, highly engaging and effective. Finally, EDU-MARtrix offers students the ability to timelessly and effortlessly navigate their urban mobility option by retrieving information at their fingertips.

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REFERENCES

- A. Mitra (2007). Substituting the chalk board with a Tablet computer. Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education, 2, pp. 1122-112
- Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, New Jersey: Prentice-Hall.
- Blumenfeld, P. C., Soloway, E., Marx, R. W., Krajcik, J. S., Guzdial, M., & Palincsar, A. (1991). Motivating project-based learning: Sustaining the doing, supporting the learning. *Educational Psychologist*, 26 (3&4), 369-398.
- Clinchy, E. (1989). Education in and about the real world. *Equity and Choice*, 3, 19-29.
- Lebow, D. G., & Wager, W. W. (1994). Authentic activity as a model for appropriate learning activity: Implication for design of computer-based simulations. Paper presented at the 1994 National Convention of the Association for educational Communications Technology Sponsored by the research and Theory Division, February 16-20, Nashville, TN, USA.
- Linn, M. C., Kessel, C., Lee, K., Levenson, J., Spitulnik, M., & Slotta, J. D. (2000). Teaching and learning k-8 mathematics and science through inquiry: Program reviews and recommendations. Retrieved January 10, 2010, from <http://www.metiri.com/Solutions/k8ReportSubmitted.doc>
- Looi, C.K., Wu, L., Sun, D., Seow, P. Chia, G., Soloway, E., Norris, C., Wong, L.H. (2014) Implementing Mobile Learning Curricula in a Grade Level: Empirical Study of Learning Effectiveness at Scale. *Computer and Education*, 77, 101-115.
- P. Siozos, G. Palaigeorgiou, G. Triantafyllakos, T. Despotakis (2009) Computer based testing using "digital ink": Participatory design of a Tablet PC based assessment application for secondary education *Computers & Education*, 52 (4), pp. 811-819
- T.L. Derting, J.R. Cox (2008). Using a Tablet PC to enhance student engagement and learning in an introductory organic chemistry course, *Journal of Chemical Education*, 85 (12) pp. 1638-1643

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